

REVIEW ARTICLE

POTATOES: THE USE OF CUT SETTS AND THE TREATMENT OF THE CUT SURFACES

BY

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INTRODUCTION

The literature reviewed here includes accounts of work on the economic, agronomic and technical aspects of the use of cut setts in place of whole seed potatoes. The results obtained by the use of whole and cut setts are compared and the different techniques used in cutting, storing and planting seed-pieces are considered in detail. Special attention is paid to the literature dealing with the use of chemicals for the control of the numerous pathogens which may invade the cut surfaces.

The economic aspects of the subject, although not sufficiently represented in the literature to warrant separate treatment in this review, are nevertheless important. Since the yields from cut setts, even under optimum conditions, are not likely to exceed those obtainable from comparable whole seed, it follows that the choice between whole or cut tubers as seed will often depend upon such economic considerations as the cost of seed potatoes of various sizes and the cost of cutting. In Europe, there has been considerable doubt whether the use of cut setts is economically advantageous (Tinley, 1939; Esbo, Fernholm and Petersson, 1950; Lauridsen and Larsen, 1948), although Luiendijk (1954), in the Netherlands, found them profitable when planted so as to give the optimum plant population. In the USA, on the other hand, the cutting of tubers into two or more seed-pieces is an accepted commercial practice: in that country, recent research has been directed towards perfecting the technique of using cut setts rather than to studying the value of the practice itself.

THE EFFECT OF USING CUT SETTS ON TOTAL YIELDS OF POTATOES.

While, under optimum conditions, the yield from cut setts may equal, or nearly equal, that obtained from whole seed potatoes, there is nevertheless a risk that serious reductions in yields may be caused by mistakes in the cutting, storage and planting of the seed-pieces, by climatic conditions unfavourable to the healing of cut tubers,

or by the incidence of diseases which attack the cut surfaces. Numerous experiments are reported in which whole tubers outyielded half tubers when both were planted at the same spacing. Bell, Gilson and Dillon Weston (1942), working at Cambridge, found that halved tubers stored up to 6 days generally yielded about 10% less than the whole seed. Decreases in yield are also reported by Priestley and Johnson (1925) in Britain, Boock (1947) in Brazil, Jähnl (1952b) in Austria, Mendívil and Escribano (1953) in Spain, and Werner (1954) in the USA. On the other hand, in experiments carried out in Gt Britain by Rhynehart (1928), Brandreth and Bryan (1936) and Megaw and Bankhead (1938), the yields from setts, planted in damp soil immediately after cutting, equalled those obtained from whole seed. It is evident that the use of cut setts, at least when planted immediately after cutting, does not *necessarily* reduce yields. It remains to review the factors which reduce, or appear to reduce, the yield from cut seed as compared with whole seed and to consider the extent to which they can be controlled, or eliminated.

Comparisons between cut seed and whole seed have often been unjust in that the yields from whole tubers have been compared with those from corresponding half tubers (which are therefore only half the weight of the whole ones) without any adjustment being made in the spacing between setts. It is known that to obtain the maximum economic yields from small whole tubers they should be planted much more densely (Esbo, Fernholm and Petersson, 1950; Boyd and Lessels 1954; and Luiendijk, 1954) than relatively large whole tubers. The same reasoning applies to the use of cut setts: to obtain the maximum economic yields from seed-pieces they should be planted, not at the same distances between setts as the whole potatoes from which they are cut, but considerably closer together. Luiendijk (1954), in the Netherlands, who gives results in terms of profitability, not yield, found that halved 45-55 mm. seed planted at 60,000 per ha. gave a greater profit than whole 45-55 mm. tubers planted at the (for them)

optimum economic rate of 30,000 per ha.

Where a uniform planting distance is employed, a fair comparison of the yields from whole tubers and cut setts can be obtained, as numerous workers have indicated, by planting whole and cut seed of the same weight. Stuart and others (1924) reported that, in extensive trials in the USA in 1914-19, there was little difference in the total yields obtained from setts of equal weight, whether whole, halved or quartered. Brandreth and Bryan (1936) obtained slightly greater yields from halved 2 oz. tubers than from whole 1 oz. tubers. Lauridsen and Larsen (1948) report trials in Denmark in which the yields from halved and quartered tubers were compared in each case with those from whole seed of similar weight. In both cases the cut setts gave yields only slightly inferior to those from the whole tubers with which they were compared. Mendivil and Escribano (1953) found that halved 100-150 g. tubers, when planted at a spacing of 65 × 50 cm., gave yields of ware potatoes, equal, or nearly equal, to those yielded by 50-100 g. whole tubers. It should be noted, however, that Petersson and Svensson (1953), in Swedish experiments lasting 10 years, found that whole 50 g. seed yielded 6-7% more than halved 100 g. seed.

It is clear from the above results that there is a very rough equivalence between the yields to be expected from whole and cut tubers of equal weight, although, on balance, cut tubers appear to give somewhat lower yields than comparable whole ones. In cases where whole seed potatoes are heavier than the cut setts with which they are compared, the tendency of the former to outyield the latter can be counteracted to some degree by planting the cut setts closer together than the whole tubers.

THE PRODUCTION OF CUT SETTS : THE INFLUENCE ON YIELDS OF THE METHODS OF CUTTING EMPLOYED, THE SEED-PIECE SIZE AND THE VARIETY.

The following aspects of the production of cut setts have an important bearing on yields : i. the size of the cut sett ; ii. the direction of the cut (longitudinal, transverse or oblique) ; iii. the variety of potato.

i. There is little indication that cut setts weighing less than about 1 oz., or about 30 g., can be employed with success, although Sprague and Evaul (1929) obtained satisfactory yields using 0.5 oz. pieces. Chucka and Steinmetz (1945), Petersson and Svensson (1953), Jähnl (1954) and Werner (1954) all successfully used cut setts weighing about 40 g. Werner, using whole seed ranging from 50-177 g. for cutting, found that increasing the weight of seed-pieces from 20 to 40 g. increased the yield by 10 bu. per ac. Kapoor (1950), in India, found that seed-pieces weighing 40 g. and having 2 eyes gave double the yield obtained from pieces weighing 5 g. which also had two eyes.

Above a lower limit of about 1 oz., seed-pieces of various weights and sizes have been used, and, in general, yields have increased with increasing size of seed-piece (Priestley and Johnson, 1925 ; Brandreth and Bryan, 1936 ; Tinley, 1939 ; Chucka and Steinmetz 1945 ; Mendivil and Escribano 1953 ; and Werner 1954). Where seed-pieces of equal weight were compared by Werner, those cut from small tubers outyielded those cut from relatively large ones. It is probable that a different impression of the relative yielding ability of large and small cut setts would be obtained if suitable adjustments were made in planting distances, that is, if the smaller setts were planted more closely than the larger ones. Sprague and Evaul (1929) who planted 0.5 oz., 1 oz. and 1.5 oz. Green Mountain seed-pieces at 7.5, 15 and 22.5 in. between setts in the row, obtained respective yields of 144, 145, and 121 bu. per ac.

ii. In Britain, where cutting is only occasionally resorted to, the simple longitudinal halving of the potato is the method generally preferred. This method has the advantage of giving more uniform yields of tubers per plant than transverse cutting, since, when the latter method is employed after sprouting has begun, the apical halves outyield the basal halves (Stewart 1936 and Jähnl 1954). "Chips" (apical ends cut about 0.5-1 in. thick and air-dried for 2-4 weeks) were experimented with in Britain (Campbell and Evans 1945 and McDermott 1945) in time of war, and were used for export where reduction in weight was essential. The yields from "chips" were, according to McDermott, about 66% of those obtained from whole tubers. In Canada and the USA, eye setts (small cut setts about 0.8 in. deep, bearing one eye and weighing about 0.5 oz.) have been used in regions where the costs of distributing seed potatoes are prohibitive. Marritt (1944) recommends that eye setts should be stored at 77°F., for 4 to 7 days, and then kept at 38° F. until dispatched. In the USA, it is customary to cut at least 2 to 4 seed-pieces weighing 1.5-2 oz. from each large tuber. Successful results obtained with seed-pieces of this size are reported in numerous accounts, including those of Chucka and Steinmetz (1945), Rieman, Cooper and Rominsky (1953) and Werner (1954). It is pointed out by Hardenburg (1949) that in cutting seed-pieces a rough equality of eye-numbers per cut sett should be sought.

iii. There is a lack of evidence on the subject of the suitability of different varieties for cutting, since no experiments appear to have been made with the specific purpose of comparing the reaction to cutting of a great number of varieties. In Sweden, Petersson and Svensson (1953) found that Ackersgen performed better than other varieties when cut. According to Priestley and Woffenden (1923) the formation of the cork layer at the cut surface of King Edward, Majestic and Bishop was slower

than in other varieties. There is no conclusive evidence, however, that these varieties, when cut and stored correctly, are more susceptible to rotting than others.

THE EFFECT OF CUTTING SEED-POTATOES ON THE SIZE OF THE POTATOES HARVESTED.

There is ample evidence that cut setts yield a slightly higher proportion of ware potatoes than do whole tubers used as seed. Priestley and Johnson (1925) found that halved seed yielded more ware potatoes than whole seed. Megaw and Bankhead (1938), Mendivil and Escribano (1953) and Petersson and Svensson (1953) also found that cut seed yielded a higher proportion of ware and a lower proportion of seed and chaffs than whole seed. In Jähn's experiments (1952a) the effect of cutting on the proportion of ware- and seed-size potatoes in the crop varied with variety. The greater the number of setts cut from one tuber, the higher the proportion of large potatoes in the total yield appears to be. Thus, according to Werner, relatively small seed-pieces produced fewer stems per plant and a greater proportion of ware than relatively large seed-pieces cut from similar whole tubers. When seed-pieces of equal size were compared by Rieman, Cooper and Rominsky (1953) and Werner (1954), those cut from larger whole tubers produced fewer stems per plant and a greater proportion of ware-size potatoes than the setts cut from relatively small whole tubers.

The general conclusions to be drawn from the above evidence are that cutting the whole seed potato reduces stem numbers per plant and increases the proportion of relatively large potatoes yielded. As the number of seed pieces cut from one tuber is increased, there is a progressive reduction in the number of stems per sett and an increase in the proportion of large potatoes harvested.

THE PHYSIOLOGICAL PROCESSES INVOLVED IN THE HEALING OF CUT SETTS AND THE OPTIMUM CONDITIONS UNDER WHICH HEALING OF THE CUT SURFACE CAN TAKE PLACE

The unimpaired skin of the whole seed potato is a barrier through which micro-organisms causing rot have difficulty in penetrating. A similar barrier is formed by the suberin and cork layers which are laid down at the cut surface of the sett during the healing process. An understanding of the healing process and the means by which it can be encouraged is therefore essential if the rotting of cut setts, whether during storage or in the ground, is to be avoided. A good account of the healing process is given by Priestley and Woffenden (1923) and may be summarized as follows: (a) a fatty suberin layer is laid down at the cut surface in the first 12-18 hours after cutting, (b) if the atmosphere is too dry the suberin layer may not be continuous, (c) within a few days of the deposition of the

suberin layer, a cork layer is formed below the suberin, (d) warmth is essential for rapid cork-formation, (e) certain varieties, such as Majestic and King Edward, form a cork-layer more slowly than other varieties.

The conditions conducive to good healing of the cut surfaces may be summarized (Priestley and Woffenden, 1923; Priestley and Johnson, 1925; Edmundson, 1940; and Bell, Gilson and Dillon Weston 1942), as follows:

1. Protection against strong sunlight, especially immediately after cutting.
2. Protection against drying winds.
3. A moist atmosphere, especially during the first day after cutting. Edmundson (1940) considers 85% relative humidity to be ideal for healing.
4. A fairly high temperature which encourages the formation of suberin and cork layers. The correct temperature at which healing should take place is 60°-70° F. according to Edmundson.
5. Adequate ventilation for the cut surfaces.
6. The cut surfaces should not come into direct contact with inorganic manure.

Even if the cut surfaces heal perfectly under ideal conditions, there is still a danger that micro-organisms may penetrate these surfaces through cracks which may be formed in various ways, e.g., by rough handling of the setts, by exposure of the healed surfaces to hot drying winds, or by direct contact of the setts with dry soil or with inorganic manures. There is also a risk that micro-organisms may enter through the cut surfaces *before* the suberin and cork layers are formed, e.g. by means of a contaminated knife. Where the danger of such infection by micro-organisms is considerable, treatment of the cut surfaces with chemicals may be necessary.

According to Werner (1954) relatively large areas of cut surface heal more slowly than relatively small areas and healing is slowest where two, or more, cut surfaces meet. Thus both the use of very large tubers for cutting and the cutting of numerous seed-pieces from one tuber can be conducive to delayed or imperfect healing.

THE RELATIONSHIP BETWEEN THE HEALING PROCESS AND THE PRACTICAL MEASURES WHICH CAN BE TAKEN TO ENSURE SUCCESS IN THE STORAGE AND PLANTING OF CUT SETTS.

The practical measures taken to ensure success in the use of cut setts must conform with the conditions for good healing described, since a perfectly healed sett is in the best condition to resist attack by the numerous rot-causing micro-organisms.

In Gt Britain the most uniformly successful results were obtained from setts which, immediately after cutting, were planted in moist soil, the ridges being split back before any harm could be done by

wind or sun (Rhynehart, 1927 and 1928; Brandreth and Bryan, 1936; Megaw and Bankhead, 1938). It appears that in moist soil, the cut sets are able to heal perfectly; few "misses" have been recorded where sets have been planted immediately after cutting. If it is impossible to obtain a moist seed bed, it is advisable (according to Edmundson, 1940 and Smith, 1940, both working in the USA) to promote healing of the cut surfaces in a moist atmosphere for about 5 days before planting. Sanford (1951) reports that sets planted immediately after cutting in a warm (61° F.) soil contaminated with *Fusarium coeruleum* are subject to severe rotting. He quotes evidence from the work of Weiss, Lauritzen and Brierley (1928) that a cut surface requires 3 days to heal sufficiently to resist penetration by *F. coeruleum*. Where cut sets have to be stored for a period longer than a week there is, according to some authors, a risk of seriously reduced yields (Rhynehart 1927, Rhynehart 1928, and Peuckii 1950) even when the sets are carefully stored, but Lombard (1937) working in Maine, USA, found no difference between the yields from sets planted immediately after cutting and cut sets allowed to heal for 6 days under controlled conditions (60° F., 85% R.H.) and stored in sheds for periods of up to 30 days.

Numerous workers agree that the method of storing has a decisive effect on yield. Although the general principles of storage-technique (i.e. use of a storage shed, shade from the sun, protection from drying winds, provision of a warm, moist atmosphere and ventilation of the cut-surfaces) are agreed upon, there is no absolute agreement on practical methods of applying these principles. Johnson (1940) recommends that, after cutting, the sets should be covered with damp sacks for 12 hours, after which the sacks should be removed. McDermott (1943) substantially agrees with Johnson's treatment, but recommends that the wet sacks should be left on the sets for 24 hours. Bell, Gilson and Dillon Weston (1942), on the other hand, recommend the use of wet sacks only when the cut sets are left in the field in windy conditions. Rhynehart (1928) found that covering the cut sets with wet sacks for the whole period before planting (1-4 weeks) gave no better results than merely storing the cut sets in a well-ventilated shed. Bell, Gilson and Dillon Weston suggest that the cut sets should be placed with the cut surfaces upwards in the storage shed to ensure their ventilation.

It seems probable that there is an optimum temperature and an optimum relative humidity for the healing of cut surfaces and that those optima can be attained by different means in practice, according to the climatic conditions prevailing. A moist atmosphere seems especially necessary during the first day or two after cutting.

In cases where there is great danger of rots

attacking the cut tuber, either in storage or after planting, special applications of chemical disinfectants to the cut surface may have to be made.

THE CHEMICAL TREATMENT OF THE CUT SURFACES OF POTATO SETTS

The earliest use of materials for treating the cut surfaces of tubers had as its main objects the hastening of healing and the prevention of water losses. Of late years, particularly in the USA where the practice of cutting seed tubers is general, treatment of the cut surfaces has been done mainly to give protection against invasion by pathogens before the completion of suberization and to prevent transmission of disease from tuber to tuber via the cutting knife.

The more important diseases which have to be taken into account when using cut seed tubers include Pythium and Fusarium rots, soft rots and blackleg caused by bacteria, Bacterial ring rot and Verticillium wilt. Their control is reviewed later.

Many substances used for the control of pathogenic invasion of the cut surfaces of seed pieces have a deleterious effect on healing, a factor which may limit their use under conditions adverse to natural healing. Certain other chemicals used to break dormancy, or to inhibit sprouting, also appear to hinder healing under certain conditions, whilst there is a small number of chemicals which have been found to promote healing. The following subsection deals with the effect of these substances on the healing and sprout growth of cut sets.

(1) The effect on healing and sprout growth of different substances used for treating cut sets.

In the past, a variety of materials, including calcium oxide, calcium hydroxide, soot, basic slag, alum and ashes has been used. With the exception of calcium hydroxide (Sanford, 1951 and Newton, 1952) and lime (Whitehead, McIntosh and Findlay, 1945), there is no evidence that these materials promote healing. Copper compounds, such as copper sulphate, carbonate and oxide have all been shown to exercise a toxic effect on the tissues of cut tubers, to inhibit wound healing and to cause severe rotting of cut sets. (Bell, Gilson and Dillon Weston, 1942; Dillon Weston and Taylor, 1944; Ramsay, 1928; Newton, 1952). Cobalt, nickel and iron salts have also proved detrimental. (Dillon Weston and Taylor, 1944).

Formaldehyde, as a hot dip or as a cold soak, has been recommended in the USA as a seed-piece treatment immediately before planting, but is reported to be capable of penetrating suberized surfaces, to affect sprouting adversely and to be more toxic than mercuric compounds (Lutman, 1937); it has been largely superseded by more effective materials.

Inorganic mercuric compounds, including mercuric chloride, mercurous chloride, yellow mercuric

oxide, mercury zinc chromate and acidulated mercuric chloride have been used extensively. Of these materials, mercuric chloride, as a 0.2% solution, has been widely used in the USA for disinfecting cutting knives against bacterial ring rot and has been recommended in India (Mehta and Singh, 1951). Lutman (1937) and Newton (1947) both report adverse effects from mercuric chloride on the healing of cut tubers. A detrimental effect on tuber healing is also reported by Nickel (1954) and Sanford (1951) for acidulated mercuric chloride (0.1% HgCl_2 + 1% HCl). According to Lutman (1937), mercurous chloride and yellow mercuric oxide do not appreciably hinder the sprouting of cut tubers, though Cunningham is quoted by Whitehead (1945) as having reported a yield reduction following their use. Lutman considered that organic, rather than inorganic, mercury compounds were preferable, and that where mercury compounds were used, cut tubers should be allowed to suberize beforehand. The use of mercury zinc chromate has reduced plant stands where no disease was present (Rich, 1952).

Organic mercury compounds used have included Sanoseed,¹ Corona P.D.7. Semesan Bel, Ceresan, Agrox, Lunasan and Puratized, of which the first three are manufactured in the USA solely for use in dip treatments for seed tubers. Both Semesan Bel and Agrox appear to be detrimental to healing and to have decreased plant stands where no disease was present (Rich, 1952; Nickel, 1954). Sanford (1951) also reports that Semesan Bel has delayed the sprouting of cut tubers and (1949) that Lunasan has resulted in stunted sprouts. Ceresan (1% ethyl mercury phosphate dip) suppressed sprout growth and seriously hindered the healing of cut tubers, according to Sanford (1949). Guillemat Lelièvre and Montégut (1952) found Puratized toxic to cut tubers in experiments *in vitro*.

Zinc oxide has been used for treating cut setts, particularly in Australia. According to Bald (1947), zinc oxide dips resulted in increased firmness of cut surfaces and did not inhibit suberization; a finding also borne out by Dillon Weston and Taylor (1944). Beare (1944) working in Australia, states that in his trials, zinc oxide had no effect on sprout growth or on plant stands, where the tubers were cut, dipped and planted on the same day. Of recent years, organic zinc compounds, including Zineb²

and Ziram have appeared in the USA. Neither compound is reported to have adverse effects on healing, while Nickel (1954) reports that a 5% Zerlate (76% Ziram) dip enhanced suberization.

A variety of other organic compounds are reported as having been used, mainly in the USA. They include: Phygon, Spergon, Ferbam, Roccal, Nabam, Manzate, Thiram, Ortho 406, Vancide 51, and Therapogen. Most of these materials do not appear to hinder wound healing materially. Roccal has been shown to be detrimental to healing (Nickel, 1954), while Spergon is noteworthy as having promoted healing and sprout growth (Sanford, 1949).

From the standpoint of lack of adverse effect on healing, the materials best suited for treating cut setts would appear to include: zinc oxide, Zineb, Ziram, Fermate, Manzate, Phygon, Spergon, Nabam and Arasan.

A recent feature in the USA has been trials on the use of antibiotics for the control of bacterial rots of seed-pieces (Bonde, 1952; 1953; 1954; Bonde and de Souza, 1954). Van Schaack (1948) reports that penicillin has prevented the sprouting of cut setts; no other antibiotic so far reported as having been used has had any apparent effect on sprouting.

It is of interest to note that Cunningham (1953) reports that the sprout-inhibiting chemicals tetrachloronitrobenzene, and, to a greater extent, the methyl ester of naphthalene acetic acid, inhibit the suberization of cut surfaces.

Most of the above-mentioned substances have fungicidal or fungistatic properties; many are more or less detrimental to the healing of cut surfaces and very few have a specifically favourable effect. However, a few non-fungicidal substances have been discovered which actively promote the suberization of cut surfaces. These include chlorogenic acid (Politis, 1948; Johnson and Schaal, 1952), and, most particularly, a class of orthodihydric phenols (Simons, Johnson and Schaal, 1953). Comparative trials carried out by Simons, Johnson and Schaal (1953) showed that 0.25% solutions of catechol and 0.33% solutions of 4-chlorocatechol (hemihydrate) both markedly increased the rate of suberization and the thickness of the suberized layer formed. The cut tubers were immersed for a few seconds and the surplus moisture removed. The use of longer dip periods

¹ Sanoseed: 7.9% ethanol mercury chloride. Corona P.D.7.: 5% mercury in a mercury bromide-phenol compound. Semesan Bel: 12% hydroxy mercury nitrophenyl + 3.2% hydroxymercury chlorophenyl. Agrox: 6.7% phenyl mercury urea. Lunasan: ethyl mercury thiourea. Puratized: phenyl mercury triethanol ammonium lactate.

² Zineb: zinc ethylene bisdithiocarbamate. Ziram: zinc dimethyl dithiocarbamate. Phygon: 2,3-dichloro-1,4-naphthoquinone. Spergon: 96% tetrachloroparabenzoquinone. Ferbam: ferric dimethyl dithiocarbamate. Roccal: alkyl dimethyl benzyl ammonium chloride. Nabam: disodium ethylene bisdithiocarbamate. Manzate: 70% manganese ethylene bisdithiocarbamate. Thiram: tetramethyl thiuram disulphide. Ortho 406: N-trichloromethylthio tetrahydrophthalimide. Vancide 51: Na salt of dimethyl dithio carbamic acid + Na salt of 2-mercapto benzothiazole. Therapogen: thymol, sodium bromparaphenyl phenate, naphthalene, safrol, thymene and terpine in soap solution.

gave better results, but was impracticable, owing to breakdown of the catechol solutions.

Denny (1938) reports some results of experiments in which whole tubers were treated with disinfectants, before being cut and treated with ethylene chlorhydrin, sodium thiocyanate, or thiourea to break dormancy. Where the whole tubers were disinfected with mercuric chloride solution, or a suspension of yellow oxide of mercury, before being cut and dipped in an aqueous solution containing 40% ethylene chlorhydrin, much rotting of seed pieces occurred. However, where the tubers had been previously disinfected with formaldehyde and cut, they responded well to the dormancy-breaking treatment and did not rot. Where any of the above three disinfectants were used, followed by cutting and soaking the seed pieces for 1 hour in 1% sodium thiocyanate, or 2% thiourea, no rotting was caused by the dormancy-breaking treatment, such as was caused by ethylene chlorhydrin when used with the mercurial disinfectants. All the dormancy-breaking treatments were effective in curtailing the dormant period. In these trials, the tubers were harvested not more than 23 days before treatment began and were thus very dormant. Rotting of cut sets occurred if there was no delay between disinfecting and planting; also, there was evidence that disinfection delayed sprouting, whether or not the sets were treated with ethylene chlorhydrin.

- (2) The use of different materials for the control of pathogens which invade the cut surfaces of sets.

Most pathogenic invasion of the cut surfaces of seed pieces occurs in the period between cutting and the completion of suberization. The source of inoculum may be either the soil in which the sets are planted or the knives used to cut them.

Pythium and Fusarium rots commonly result from planting in contaminated soil and their chemical control has usually consisted of fungicidal treatment of the cut surfaces to give protection until suberization is complete. Bacterial rots are commonly caused by contaminated cutting knives, and consequently, control measures have mostly been directed towards the disinfection of cutting knives, or the disinfection of seed-pieces immediately after cutting.

There is some evidence that certain sap-transmissible viruses, such as spindle-tuber (Goss, 1926) and ringspot virus X (Larson, 1950) may be passed from infected to healthy tubers by means of cutting knives. Lihnell (1947) in Sweden, and Bawden, Kassanis and Roberts (1948) in England, however, were unable to transmit virus X (latent mosaic) by this means. It appears that the storage parenchyma of potato tubers has a low content of virus when infected, and, when healthy, is resistant to infection by inoculation. The question of

virus transmission by cutting knives appears to be relatively unimportant and no control measures seem to have been found necessary.

In the following subsection, work done on the control of the more important pathogens which attack cut tubers is reviewed.

Pythium rot. Newton and Lines (1947), working in Canada, stress the value of the proper healing of the cut surfaces of seed pieces as a means for reducing the incidence of rots caused by *Pythium ultimum*, when planting in damp, heavy soils. In their trials in which tubers were cut, dusted with a number of fungicides and planted as one operation, Fermate (76% Ferbam) was most effective in controlling Pythium rot, followed by Spergon and Arasan. Dithane (Nabam formulation) and Semesan Bel were relatively ineffective, while the use of copper sulphate resulted in a very high incidence of rot in cut tubers. Following these results, the use of Fermate for control of Pythium rot was recommended. Trials carried out by Sanford (1949) in Alberta, showed that sulphur dust was ineffective, and that 0.4% Dithane and 1% Fermate dips were only partially effective for controlling Pythium rot, while 1% Ceresan (ethyl mercury phosphate) dip and Fermate dust treatments gave complete protection to cut sets. Ceresan, however, was observed to inhibit sprout production. Young and Milbrath (1951; 1952) report good control of Pythium and Fusarium rots following dip treatments using 1 lb. Phygon per 10 gal. water, 1 lb. Semesan Bel per 7.5 gal. water, or Ziram. In these trials, the tubers were cut, dipped and planted immediately.

Fusarium rots. Rich (1952) reported that Phygon, Spergon, Parzate (65% Zineb), Zerlate (76% Ziram), Arasan and Ortho 406 dusts all gave satisfactory control of Fusarium rot in contaminated greenhouse soil. In further trials in which cut seed-pieces were dipped in a slurry of rotted tubers and water, instant-dips of Parzate, Zerlate and Vancide 51 improved stands slightly, while Semesan Bel, Phygon, Ortho 406 and Manzate resulted in almost complete stands, compared with 82% stands for inoculated, but untreated, controls.

Newton (1952) reported that Arasan, Fermate and Spergon dust treatments all gave a measure of control of Fusarium attack and he attributed part of the success of using these materials to the fact that they offered only slight hindrance to the process of healing. Sanford (1949) in Canada, found that planting cut sets in soil contaminated with *Fusarium coeruleum* at 61° F. resulted in very severe rotting. Treating with 1% Fermate (76% Ferbam) dust, 0.5 and 1% Lunasan dips, 0.5 and 1% Ceresan dips, 1, 1.5 and 2% Spergon dips and Spergon dust all resulted in almost complete control of rotting. Ceresan and Lunasan were detrimental to sprouting. Semesan Bel, Dithane (Nabam), yellow oxide of mercury, mercuric

chloride, sulphur and calcium hydroxide all gave inferior control of rotting. On the other hand, Cunningham and Reinking (1946) in Long Island and Nielson (1949) in Idaho, both report that Semesan Bel treatments were effective in reducing Fusarium wilt. Lane (1952) reports that low concentration dusts of Thiram and Zineb were outstanding in reducing seed-piece rotting in greenhouse soil infected with Fusarium. In tests in Colorado, he found that these materials significantly reduced rotting, increased plant stands and raised yields after adverse conditions of cut-seed storage, and of temperature and soil moisture at the time of planting. Guillemat, Lelièvre and Montégut (1952), in France, report the effectiveness of Phygon, Dithane (Nabam) and Fusarex (3% tetrachloronitrobenzene dust) for controlling Fusarium attack on cut tubers.

Bacterial ring rot (*Corynebacterium sepe-donicum*). This disease is of great importance in North America. It was first reported from Germany, but, to date, has not appeared in Great Britain. The practice of cutting seed tubers in the USA is a major factor in disseminating this rot, since the disease can be transmitted by the cutting knife. Treatments for disinfecting cutting knives have included boiling water and a 0.2% solution of mercuric chloride. Lane, Kunkel and Kreutzer (1948) report that the addition of a wetting agent improved the effectiveness of mercuric chloride knife dips. Raeder (1949) reports that both 10% Therapogen and B.K., a formulation containing 50% chlorine, have been effective as disinfectants for power-driven, revolving knives, though B.K. rapidly lost its strength in use. Lane (1949) obtained good control of ring rot by disinfecting vertically-mounted knives by wick-feeding a 0.2% mercuric chloride solution, or a calcium hypochlorite solution (5000 ppm. Cl), over the blade at a rate of 2 qt. per hour.

For treating seed pieces after cutting, Mehta and Singh (1951) in India found that a 15-minute dip in 0.2% mercuric chloride solution was satisfactory. Lane, Lunkel and Kreutzer (1948) reported that an instant-dip of cut setts in 0.2% mercuric chloride solution, or a 2000 ppm. solution of chlorine reduced the incidence of ring rot, but by no means controlled it. Van Schaack (1948) reported that seed pieces inoculated with ring rot

and then treated with streptomycin sulphate grew normally, but untreated inoculated controls rotted.

Species of bacteria causing seed-piece rot and blackleg. Experiences in Maine (Bonde, 1950) indicated that blackleg tended to be severe where cut setts were stored for some time before planting, and was often associated with heating during storage. Blackleg has been rare where setts were planted immediately after cutting. Nickel (1954), in California, reports that an instant-dip treatment of cut setts in 0.2% HgCl_2 + 1% HCl was effective for controlling blackleg caused by *Erwinia atroseptica*. The seed-pieces were inoculated either by contaminated cutting-knives, or by adding a slurry of rotted tubers to the mercuric chloride dip treatment; the setts were planted in spring, 24 hours after treatment. Nickel found the mercuric chloride dip to be detrimental to stands where the setts were planted in hot, dry soil in autumn. 1% Vancide 51ZW (zinc salt of Vancide 51) and 0.2% Roccal were less effective than acidulated mercuric chloride for controlling blackleg. Bonde (1953) found that solutions of 10-30 ppm. dihydro-streptomycin sulphate, or streptomycin sulphate, were effective for controlling soft rot caused by a virulent isolate of *Erwinia atroseptica* on cut tubers, but were ineffective against *Pseudomonas fluorescens*. Aureomycin controlled *Ps. fluorescens*, but not *E. atroseptica*. In further trials, Bonde (1954) found that where seed-pieces were soaked for 30 minutes in concentrations of 50 ppm. streptomycin sulphate or streptomycin sulphate + terramycin hydrochloride, after being inoculated with organisms producing black-leg and seed-piece decay, full stands were obtained in the field, whereas almost all setts that were inoculated, but not treated with the antibiotics, rotted. Terramycin, alone, was not able to give full protection against blackleg. In Bonde's view, a combination of antibiotics was a more versatile means than a single antibiotic for controlling the different pathogens which may cause seed-piece decay.

Verticillium wilt (*Verticillium albo-atrum*). Robinson and Ayers (1953), in Canada, obtained good control of Verticillium wilt by the use of Semesan Bel as an instant-dip treatment for cut setts.

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FIELD CROPS

CEREALS

WHEAT

- 1 ZABAZNYI, P. [**Wheat in the USSR.**] [Russian] *Soc. sel's. Hoz. (Social. Agric.)* 1954, **25**, No. 6, 37-47.

An account is given of the areas sown with winter and spring wheats in different parts of the Soviet Union from pre-Revolution days to the 1950 decade. There is also a description of yields obtained from various localities and of measures (including early sowing and acceleration of harvesting processes) necessary for increasing yields, with special reference to the growing of wheat in Kazakhstan, Siberia, the Ural area, the Volga provinces, parts of northern Caucasus and Transcaucasia.—M.H.

- 2† LUTRI, I. Rottura del prato artificiale. [**Ploughing a sown meadow.**] *G. Agric. Domen.* 1954, **64**, No. 30, 237.

The best period for ploughing a legume ley in Italy, with a view to preparing a good seed-bed for the following crop, generally wheat, is spring-summer in such regions as Sicily, where the summer is very dry, and autumn in regions having a more humid summer.—E.B.O.

- 3 SINGH, R. P. **The effect of firming the soil over the seed at sowing time on the yield of wheat.** *Allahabad Fmr* 1954, **28**, No. 2, 32-6, illus. [Agron. Dep., Allahabad Agric. Inst.]

The effect of compaction of the soil over wheat seed (by seed-drill wheels) on the number of ears per plant, height of plant, yield of grain and straw per ac. and yield of grain per ear of wheat was observed in an experiment in 1953 in which rows of wheat compacted in this way were compared with rows in which the soil was not compacted. The compacted rows yielded significantly more grain per ac. and a significantly greater number of ears per ac. than the uncompacted rows.—W.J.B.

- 4 HORE, H. L. and SIMS, H. J. **Loss of topsoil. Effect on yield and quality of wheat.** *J. Dep. Agric. Vict.* 1954, **52**, No. 6, 241-50, illus.

A reduction in the yield of wheat grown on wind-eroded patches was noted in Mallee fallows, Victoria. This may be due largely to inferior seed-bed conditions. Wheat grown on such soil has a lower protein content.—M.P.

- 5 SEVAST'YANOV, I. [**Strip crops of *Sinapis alba* in sowings of winter wheat.**] [Russian] *Zemledelie (Agriculture)* 1954, **2**, No. 6, 67-72, illus. [Ukrainian Inst. Social. Agric.]

- 6 CALDWELL, R. M. and others. **Knox, a new leaf rust resistant and stem rust escaping soft winter wheat.** [Abstract] *Phytopathology* 1954, **44**, No. 9, 483-4.

Notes are given on Knox, a soft, red, winter wheat with resistance to leaf rust (*Puccinia rubigo-vera tritici*). Knox possessed a "mature plant" type of resistance and its relative earliness (7-14 days earlier than standard varieties in Illinois) allows it to escape early infection by stem rust [*P. graminis tritici*]. This variety also has yield, milling and baking qualities superior to those of currently-grown varieties in Illinois.—P.J.B.

- 7 WAGNER, S. and POPOW, G. Die wichtigsten Weizensorten des schweizerischen Richtsortimentes für den Getreidebau 1954. [**The most important wheat varieties amongst the Swiss standard list of cereals for cultivation in 1954.**] *Mitt. schweiz. Landw.* 1954, **2**, No. 7, 125-32, illus. [Eidg. Landw. Versuchsanst., Zürich-Oerlikon, Switzerland]

Of the wheat varieties cultivated in Switzerland in the pre-war years, Huron is the only one which has retained its importance. The others have been replaced by new varieties, namely, the winter wheats Probus, Mont-Calme 245 and Mont-Calme 268, and the spring wheat Lichti's Weihenstephan. A brief account is given of the history, botanical features and cultivation characteristics of each of these varieties.—D.B.

- 8 MALIANI, C. Frumenti eletti anziani e nuovi di fronte all'esperienza di un'annata nera. [**Old and new selected wheat varieties after the experience of a bad year.**] *G. Agric. Domen.* 1954, **64**, No. 38, 291-2, illus. [Ist. Tec. Agr. "N. Strampelli" Lonigo, Vicenza, Italy]

Because of adverse climatic conditions, wheat production in Italy in 1954 was considerably lower than in previous years, being estimated at a little over 7 million metric tons. In this bad year, however, it was possible to test the hardiness of the principal wheat varieties. San Pastore 14 was the most frost-resistant in northern Italy. In the lower Po Valley and Romagna, Funo yielded best in most soils, and Mara in the more fertile soils. In central and southern Italy and Sardinia, Funo, which proved to be resistant to high temperatures and adapted to clay soils, was the best on good soils, while San Pastore 14 yielded well on the best hill soils. Est Mottin was the best variety for the Apennines. Of the durum wheats grown in southern Italy, Cappelli was the best, followed by Garigliano and Russello, while Aziziah, early, was the best in the driest regions of Sicily. Information is also

given on new wheat varieties which are not yet widely grown. Among these are Giuliani, Generoso and Campodoro, all frost-resistant. Giuliani is similar to San Pastore but more resistant to lodging. Generoso is particularly suitable for clay soils. Verna and Ovest are new varieties for the mountains. Grifoni 235, a new variety of durum wheat, is early and resistant to lodging.—E.B.O.

- 9 SHIER, F. L. and REEVES, J. **Wheat variety trials on research stations, 1953.** *J. Dep. Agric. W. Aust.* 1954, **3**, No. 3, 365-70, illus. Results from 6 stations are given. Gabo and Wongoondy are early-maturing varieties suitable for all areas. Of the later varieties, Bencubbin yields well, and Kondut and Eureka are suitable for areas of higher rainfall.—M.P.

- 10 DUBOVİK, Ja. and IMRANOV, Š. [**Hard wheats in northern Kazakhstan.**] [Russian] *Zemledelie (Agriculture)* 1954, **2**, No. 6, 78-81.

- 11 PANDE, H. K. **Effect of 2,4-D on yield of wheat.** *Agra. Univ. J. Res. (Sci.)* 1953, **2**, Pt. 2, 41-4, bibl. 4. [Dep. Agron., B.R. Coll., Agra]

The following spraying and weeding treatments were applied to PB591 wheat in 1951-2: spraying with 2,4-D at 3.25, 4.88 and 6.5 lb. per ac., respectively; hand-weeding; control (no weeding or spray treatment). Each treatment was applied at 6, 9 and 12 weeks after sowing (i.e. at tillering, boot and flowering stages). All weeds except *Cyperus rotundus* were killed within 3 weeks of spraying. The highest yields of grain were obtained on the hand-weeded plots which yielded significantly more than the plot treated with 6.5 lb. per ac. 2,4-D and significantly more than the control. Plots treated with 2,4-D at 3.25 and 4.88 lb. per ac. yielded more, but not significantly more, grain than the control plot or the plot treated with 6.5 lb. 2,4-D per ac. Both spraying and hand-weeding at 6 or 9 weeks after sowing gave greater grain yields than corresponding treatments at 12 weeks after sowing, but the differences were not significant.—W.J.B.

- 12 PANDE, H. K. **Effect of sodium dichlorophenoxyacetate on crop and weeds in wheat field.** *Agra. Univ. J. Res. (Sci.)* 1954, **3**, Pt. 1, 241-52, bibl. 25. [Dep. Agron., B.R. Coll., Agra]

An experiment previously reported [see Abs. 11] was continued in 1952-3. Aqueous sprays of Fernoxone (sodium dichloro-phenoxyacetate) were applied to a wheat crop at concentrations of 3.25, 4.88 and 6.5 lb. per ac. active material at 3 different stages of crop growth (tillering, boot and flowering stages). Certain plots were hand-weeded. The effect of the different treatments on weed growth, crop growth, grain yields and grain quality was

recorded. At earlier stages of weed growth even the lowest concentration of herbicide gave more than 80% kill of all weeds, except for *Cyperus rotundus* (8% kill) and *Spergula arvensis* (62% kill). At the flowering stage of crop development the herbicide at 3.25 lb. per ac. gave over 70% kill of all weeds, except for those mentioned above; at 6.5 lb. per ac. it gave 82-99% kill of all weeds, except for *C. rotundus*. There were no significant differences between the yields of grain from the plots treated at different rates; the highest grain yield from chemically treated plots was from those treated at the lowest rate. The yield from plots treated at 4.88 and 6.5 lb. per ac. was significantly lower than the yield from hand-weeded plots. The yield from the plots treated at the lowest rate (3.25 lb. per ac.) was lower, but not significantly so, than that of the hand-weeded plots. Data on the length of ear, total number of spikelets per ear, number of grains per ear, number of fertile shoots per plot, and total dry matter per plot obtained with the different treatments are tabulated. All treated plots showed a significant increase of fertile shoots and dry matter per plot compared with the unweeded control. Application of the herbicide to the crop at the tillering stage gave significantly higher yields of grain than an application at other stages, and when applied at this stage the sprays gave yields of grain equal to those obtained with hand-weeding. Differences in the concentration of the spray applied at tillering did not significantly affect yield. The relative ineffectiveness of later sprays was ascribable to an increase in the number of sterile florets. Thus, applied at the tillering stage, Fernoxone, at the lowest concentrations used, gave grain yields equal to those obtained by hand-weeding and both methods gave highly significant increases in yield compared with no weeding. Compared with the unweeded control the N content of the grain was increased (on the average of all treatment dates) by 10.5%, 16.6%, and 16.2% in the case of plots treated with Fernoxone at rates of 3.25, 4.88 and 6.5 lb. per ac. The increase for hand-weeded plots was 7.2%.—W.J.B.

- 13 WOOFER, H. D. and LAMB, C. A. **The retention and effect of 2,4-dichlorophenoxyacetic acid (2,4-D) sprays on winter wheat.** *Agron. J.* 1954, **46**, No. 7, 299-302, bibl. 14. [Agron. Dep., Ohio State Univ., Columbus]

Applications of 0.75, 1.5 and 3 lb. acid equivalent of 2,4-D triethanolamine salt per ac. were made in spray volumes of 3, 6 or 12 gal. per ac. to wheat at 9 growth stages, from the 4-leaf stage on 21 March to the post-fertilization stage on 31 May. At the 4-leaf stage, 55% of the applied 2,4-D was retained by the plant surfaces. The amount retained increased at successive growth stages, until a value of 95% was reached at the late boot stage, after which the value remained approximately

constant. For the 3, 6 and 12 gal. per ac. spray volume treatments, the average spray retention was 86, 85 and 76%, respectively; the differences were greatest at the early growth stages. Applications made at the early boot and early head stages resulted in grain yield reductions of 33 and 56%, respectively; yield reductions were marked where the 3 lb. per ac. rate of 2,4-D was used. The effect of spray volume on 2,4-D retention on the plants was not reflected in the grain yields. In a second trial, 6 different formulations of 2,4-D were applied to wheat at 4 growth stages in 5 gal. spray per ac. Formulations used included: (a) triethanolamine salt, with spray solution pH 7.75, (b) triethanolamine salt + 1% Tween 20, (c) triethanolamine salt + 1% Tergitol 7, (d) 40% butyl ester formulation, (e) 44% isopropyl ester (Dow Esteron 44) formulation and (f) triethanolamine salt with spray solution pH 4.45. Formulations (c) and (e) had the highest spray retention percentages, with (e) the higher of the two. There were no significant differences between the spray retention percentages of the other formulations. The differences between formulations in terms of effect on grain yield followed a similar trend, with formulations (e) and (c) causing highly significant yield reductions when applied to the wheat at a susceptible growth stage. Formulation (c) caused the most marked yield reductions. In a third trial, 3 resistant and 3 susceptible varieties (as determined in greenhouse screening) of soft, red, winter wheat were used to assess their responses to 2,4-D treatments in the field. There were no significant differences between varieties in retention of 2,4-D, though retention was greatest in the case of varieties found susceptible to 2,4-D. There were significant differences between the varieties in terms of grain yield following 2,4-D treatment, but the differences could not be attributed to differences in spray retention.—P.J.B.

- 14 KLINGMAN, D. L. **Effects of varying rates of 2,4-D and 2,4,5-T at different stages of growth on winter wheat.** *Agron. J.* 1953, **45**, No. 12, 606-10, bibl. 29, illus. [Nebraska Agric. Exp. Sta., Lincoln]

Pawnee wheat was treated at the jointing, early-boot, late-boot and flowering stages with the following rates of herbicides (acid-equivalent basis): 0.125, 0.25, 0.5, 0.75, 1 and 2 lb. 2,4-D ester, 0.5 and 1 lb. 2,4-D amine and 1 lb. ester of 2,4,5-T, each in 40 gal. spray volume per ac. In a further trial, studies were made of the differential responses of winter wheat varieties treated with 1 lb. of 2,4-D ester per ac. in autumn in the 2-3 tiller stage, with 3 leaves per tiller, or in spring, when the wheat was 6-10 in. high. All plots were maintained in a weed-free condition. With few exceptions, all applications of herbicidal amounts of 2,4-D caused a reduction in grain yields. Yield reductions were relatively

small where amounts of under 0.5 lb. 2,4-D ester, or 1 lb. 2,4-D amine per ac. were used at all growth stages. The effect of 2,4,5-T on yields was similar to that of 2,4-D. The greatest injury was caused by spraying at the early-boot and flowering stages. The number of kernels per ear was the factor most consistently affected by herbicidal treatment. In only one case was there a marked relationship between a reduced number of spikelets per head and a reduction in yield; this occurred in one year where the herbicides were applied at the jointing stage. In no case did the treatments significantly affect the number of culms or heads per ft. of row. The protein content of the grain appeared to be inversely related to grain yields in response to the herbicides. In the autumn and spring spraying-trials during 2 years, autumn treatments severely reduced subsequent grain yields, while spring treatments caused relatively small yield reductions. Differential responses of varieties $\times$ treatments were small, but significant, in one out of two years, only.—P.J.B.

- 15 RAI, G. S. and HAMNER, C. L. **Persistence of sodium trichloroacetate in different soil types.** *Weeds* 1953, **2**, No. 4, 271-9, bibl. 22, illus. [Michigan State Coll., East Lansing]

In pot trials, amounts of 15, 30 and 60 lb. acid equivalent of TCA per ac. were mixed with 4000 g. Oshemo sand, 3700 g. Brookston clay-loam and 1700 g. of an organic soil. The TCA was mixed with the soils at 21, 42, 64 and 108 days before sowing with spring wheat. The fresh-weight and dry-matter yields of the plant tops and roots were directly related to the amount of TCA applied. The residual effect of TCA was much lower on the sandy soil than on the other two soils. On the sandy soil where wheat was sown 42 days after TCA treatment, 15 lb. TCA per ac. caused no injury, while 30 lb. per ac. caused only slight injury to the plants; 60 lb. TCA per ac. reduced the fresh-weight yield of tops per pot from 19.33 g. for controls, to 10.66 g. On the clay-loam and organic soils, all rates of TCA applied 42 days before sowing caused marked injury to the wheat. Where a period of 64 days elapsed between TCA treatment and sowing, rates of TCA up to 60 lb. per ac. on the sandy and clay-loam soils had no effect on wheat growth. On the organic soil, rates of 60 lb. per ac. had a pronounced residual effect on the wheat where 108 days had elapsed between TCA treatment and sowing. The greatest suppression of growth, irrespective of soil type, occurred where 15 days elapsed between TCA treatment and sowing.—P.J.B.

- 16 BROMFIELD, K. R. and PEET, C. E. **Chemical modification of rust reaction of seedling wheat plants infected with *Puccinia graminis tritici*.** [Abstract] *Phytopathology* 1954, **44**, No. 9, 483.

In trials in which wheat seedlings were sprayed to incipient runoff with 0.075-0.16% solutions of maleic hydrazide 1-3 days after inoculation, there was a consistent reduction in the resistance of the plants to wheat stem-rust.—P.J.B.

- 17 BULGER, R. O. **Barberry eradication [in the U.S.A.]**. *Agric. Chem.* 1954, **9**, No. 6, 60-1 and 147-9, illus. [U.S. Dep. Agric., Minneapolis, Minn.]

Notes are given on herbicidal treatments suitable for eradicating *Berberis canadensis*, *B. fendleri* and *B. vulgaris*.—P.J.B.

- 18 PURDY, L. H. and HOLTON, C. S. **Differences in phytotoxic properties exhibited on spring wheat by fungicides used for smut control**. [Abstract] *Phytopathology* 1954, **44**, No. 9, 503.

In trials with Panogen, Ceresan M, Agrox and Anticarie there were differences in the phytotoxic qualities of these materials, particularly at rates of over 5 oz. per bu. of seed. At the minimum recommended rates for control of smut [*Ustilago tritici*], all these materials were slightly phytotoxic, and to about the same extent in each case. The maximum permissible dosage consistent with reasonable lack of phytotoxicity was 1 oz. per bu. for Ceresan M and Agrox, and 2 oz. per bu. for Panogen. At rates above these, Panogen was consistently less phytotoxic than Ceresan M and Agrox. The slight phytotoxicity exercised by Anticarie at rates of 0.5 oz. per bu. did not increase as rates of treatment rose to 10 oz. per bu. Marfed and Baart wheats appeared to be slightly less susceptible to phytotoxicity than Idaed and Federation.—P.J.B.

- 19 AEBI, H. La lutte contre la carie naine du froment. [Control of dwarf bunt in wheat, *Tilletia brevifaciens*, G. W. Fischer.] *Rev. rom. Agric.* 1954, **10**, No. 10, 77-9, bibl. 12, illus. [Stat. Féd. Essais Agric., Lausanne, Switzerland]

Dwarf bunt, a disease which reduces the height of wheat plants by half, recently appeared in Switzerland and has spread to an extent even greater than was expected. It is at present chiefly confined to altitudes above 620 m., but it is feared that it will soon spread to the plains. The disease is propagated solely by spores in the soil. It can be controlled by treating the soil surface, immediately, or a few days after sowing, with pentachloronitrobenzene, at the rate of 75 kg./ha., mixed with sand or fertilizer. The fungicide should be applied uniformly and allowed to remain on the surface of the soil and not buried by harrowing. Particular care should be given to the borders of the field. The treatment is effective for one season only.—D.B.

- 20 DUFF, A. D. S. **A new disease of wheat in Kenya caused by a species of *Pyrenophora***. *E. Afr. agric. J.* 1954, **19**, No. 4, 225-9, bibl. 9, illus.

The disease organism known as *Pyrenophora tritici-repentis* appears to have existed in Kenya for some time and may previously have been mistaken for *Helminthosporium sativum*. There appear to be varietal differences in susceptibility to the organisms. The fungus is seed-borne, both externally and internally. The use of organomercurial dust for seed dressings reduces the incidence of the disease.—M.P.

- 21 RYKER, T. C. and CLEMENT, E. F. **Ethyl mercury p-toluene sulfonanilide, a chemical for control of snow mold of wheat**. [Abstract] *Phytopathology* 1954, **44**, No. 9, 504-5.

In trials to control snow mould (*Typhula* sp. and, to a lesser extent, *Fusarium nivale*) in the north-western States of the USA, dusts containing 5 lb. Ceresan M (7.7% ethyl mercury p-toluene sulfonanilide), with urea (NuGreen) as a carrier, and sprays containing 2.5 lb. per ac. Ceresan M-2X (15.4% ethyl mercury p-toluene sulphonanilide) with or without urea as a carrier, were applied. In early May, when evaluations were made, the spray treatments were superior to the dusts and gave almost complete control of the disease under conditions favourable to its incidence. The addition of urea as a carrier hastened the recovery of the plants. Neither formulation of Ceresan had any apparent phytotoxic effects.—P.J.B.

- 22 TALHOUK, A. S. **Further trials with Parathion dusts against *Eurygaster integriceps* Put. (Hemiptera, Pentatomidae)**. *Bull. ent. Res.* 1954, **45**, No. 3, 495-500, bibl. 3. [Minist. Agric., Damascus, Syria]

Results from a field experiment in which a dust containing 0.75% Parathion was applied under a drag-sheet to 3 plots of wheat at rates of 40, 20 and 10 kg. per ha., respectively, showed that treatment reduced the population of *Eurygaster integriceps* in the 3 plots by 98.4, 83 and 65%, respectively, compared with a control plot. In a further field experiment carried out on a larger scale in an area in which plots of wheat were interplanted with plots of barley, 5 plots of wheat were treated with a dust containing 0.8% Parathion at a rate of 35 kg. per ha. without using a drag-sheet. In 2 of the plots which were dusted in calm weather, about 89% control was obtained, but in the other plots the effectiveness of the dusting was appreciably reduced by wind.—From author's summary.

- 23 FEDOROVA, I. N. [Research on inducing toxicity in wheat by spraying its leaves with octamethyl to protect the crop from *Eury-*

gaster sp.][Russian] *Doklady Vsesojuz. Akad. S.-H. Nauk (Proc. Lenin Acad. agric. Sci.)* 1954, **19**, No. 5, 44-7, bibl. 5. [All-Union Sci. Res. Inst. Pl. Protect.]

The preparation (so-called octamethyl) is octamethyltetramide pyrophosphoric acid. The author's preliminary tests (two replications) have shown that by spraying only the leaves of spring wheat at the tillering phase with a 5% solution of octamethyl, a kill was obtained of 90.8% of the pest which fed only on the stems. It is therefore concluded that the toxic effect of octamethyl is translocated from the leaves to the stems. Under conditions of the tests with winter wheat at the earing phase, a 5% solution of octamethyl applied to the leaves (at a rate of 400 l./ha.) resulted in a destruction (after 3 days) of 27.8% of *Eurygaster* which fed on the crop, and 100% destruction after 17 days. Comparable figures for 5% DDT dust (40 kg./ha.) were 14.3% after 3 days and 44.8% after 17 days. The phytotoxic effect of octamethyl was tested on winter wheat (at shooting stage). This showed that using a 10% solution caused excessive yellowing of the leaves on the day following application, but 10-15 days later the plants were almost as normal as the control specimens. A 5% solution caused rather less yellowing and 1% produced no yellowing. Octamethyl is recommended for the control of *Eurygaster* sp. because of the high degree and prolonged duration of its toxicity.—M.H.

- 24 HASTINGS, E. and COWAN, T. E. **Seed treatment of fall planted wheat for wireworm control.** *J. econ. Ent.* 1954, **47**, No. 4, 597-9, illus. [Montana State Coll. Agric. Exp. Sta.]

To control wireworms, wheat seed was treated before sowing with Mergamma, a mixture of 40% γ benzene hexachloride and 2% phenyl mercury urea. The increases in grain yield obtained by this treatment varied from 0.4 to 8.6 bu. per ac. The best rate of application is thought to be 2.25 oz. of Mergamma per bu. of wheat.—E.B.O.

- 25 HARVEY, T. L. **Chemical control of a spider mite on wheat in eastern New Mexico.** *J. econ. Ent.* 1954, **47**, No. 4, 593-7, bibl. 4, illus. [New Mexico Coll. Agric. Exp. Sta.]

Of 14 preparations tested, Systox and Parathion gave, consistently, the best control (75% mortality) of the spider mite (*Paratetranychus pratensis*).—E.B.O.

- 26 SLYKHUIS, J. T. and HORRICKS, J. S. **Problems encountered when spring wheat is seeded after working up streak mosaic diseased winter wheat.** [Abstract] *Phytopathology* 1954, **44**, No. 9, 506.

In cases in southern Alberta where it has been thought necessary to kill by soil tillage, winter-wheat crops which have shown severe damage by streak mosaic, the spring wheat which has been sown after tilling the winter wheat, has not always escaped infection by streak mosaic owing to a poor kill of the winter wheat. A delay of at least one week in sowing spring wheat after the thorough tilling of the winter wheat is thought sufficient to ensure that the spring wheat does not become infected. Among other possible reasons for poor growth of spring wheat is the production of growth-inhibiting factors by the decaying winter-wheat seedlings. In greenhouse trials, the emergence and growth of wheat seedlings in unsterilized soil have been significantly reduced where wheat seedling leaf material was incorporated in the soil. In sterile soil, neither unsterilized nor sterilized wheat seedling leaf material produced this effect, which seemed to be more characteristic of wheat seedlings than of mature plants.—P.J.B.

- 27 MOJA, A. **Rilievi sugli effetti delle lesioni traumatiche alle plantule di frumento (*Triticum vulgare* Vill.). [Effects of traumatic lesions on wheat (*Triticum vulgare*) seedlings.]** *Ann. Sper. agr.* 1954, **8**, No. 4, 1247-56, bibl. 22, English summary p. 1255. [Ist. Agron. Univ. Milano]

To study the extent of the damage due to injuries caused by birds and rodents to wheat during emergence, 200 seedlings of the wheat variety San Pastore were artificially injured by amputating the plumule at the haulm node at ground level, and 200 other seedlings at 1 cm. above the node. Amputation at the haulm node was shown to cause a reduction of 28% in plant density, as against 6% in the plants cut at 1 cm. above the node, and 5% in the uninjured controls. Both amputation at the haulm node and at 1 cm. above the node caused a considerable reduction in the average number of ears per plant, weight of ears per plant, number and weight of the seeds per plant and the hectolitre weight of the grain. The hectolitre weight was about 69 and 73 kg. for the plants injured at the haulm node and at 1 cm. above the node, respectively, as against 77 in the controls.—E.B.O.

- 28 ZUEV, L. A. and GOLUBEVA, P. F. **[Absorption of phosphorus by germinating seed and seedlings of spring wheat.]** [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR)* 1954, **96**, No. 2, 387-9, bibl. 5. [Moscow State Univ.]

While it is known that phosphorus has its greatest effect on plant development in the early growth stages, the usual method of chemical analysis (of seed or plant) for P content does not determine at what period phosphorus is absorbed from the nutrient medium. To elucidate this, the authors

have used a radio-active indicator (P^{32}) in studying the absorption of phosphorus by different parts of the germinating seed and by the different organs in seedlings of spring wheat, variety Moskovka. Under conditions of the test, there is evidence that P absorption by the seed begins simultaneously with seed swelling through imbibition. The concentration of P is 18 times greater in the embryo than in the endosperm. P in the endosperm is utilized more slowly by the growing plant than are other nutrients. P in the seedling is concentrated chiefly in meristematic tissue, and it is considered that this fact indicates the importance of P in seedling metabolism and development.—M.H.

- 29 BOSEMARK, N. O. **The influence of nitrogen on root development.** *Physiol. Plant.* 1954, **7**, No. 3, 497-502, bibl. 6. [Bot. Lab., Lund Univ., Sweden]

Pot studies, using wheat, were made to determine the effect on root growth of different amounts of N in the nutrient medium, with and without the auxin 1-naphthalene acetic acid (NAA) or the anti-auxin alpha-parachlorophenoxyisobutyric acid (PCIB). With wheat, it took about 7 days for the N reserves of the seed to be used up. With the lowest N supply in the nutrient medium, root elongation was greatest. Very high N supplies tended to stunt root growth. PCIB in the presence of low N supplies had little effect on root length. In the presence of high N supplies, PCIB markedly increased root length. NAA had an opposite effect to PCIB, in that NAA was far more effective in reducing root elongation in the presence of low N supplies than at high levels of N supply. The inhibitory effect of high N supplies on root cell multiplication was very marked where the plants were deseeded; PCIB largely counteracted this inhibitory effect. Root-length increase at low levels of N supply was mainly due to cell elongation, while high levels of N supply inhibited both cell length and cell multiplication. It is suggested that increasing the N supply to roots increases the amount of natural auxin in roots.—P.J.B.

- 30 JOHNSON, V. A. **Culm morphology and development in winter wheat.** *Bot. Gaz.* 1954, **115**, No. 3, 278-84, bibl. 5, illus. [Agric. Exp. Sta., Univ. Nebraska, Lincoln]

Culm measurements were made every 2 days in 3 varieties of winter wheat: Blue Jacket, tall and late maturing; Pawnee, medium in height and in date of maturity; and Seu Seun 27, a very short and early-maturing variety. The culm measurements consisted of the length of each of the 5 internodes which contribute to plant height, the spike, and the entire culm. Elongation of each internode began slowly, attained a maximum, and decreased. It began at approximately the same time as the internode below ceased to elongate.

The varieties were similar in that their higher and later-developing internodes were progressively longer. There was, however, a marked difference in the increment of internode length of progressively higher internodes and this resulted in wide differences in the final plant height of the three varieties. It is also noted that the rate of development of a variety is not directly related to its mature plant height. [See also *Fld Crop Abstr.* 7: 1117.]—D.B.

- 31 GUPTA, D. **Effect of varying photoperiods on growth and development of wheat.** *J. Indian Bot. Soc.* 1953, **32**, No. 4, 165-71, bibl. 6. [Herbert Coll., Kotah, India]

The effects were investigated of natural day length, continuous illumination and daily photoperiods of 6 hr. on the growth characteristics, dry-matter accumulation, flowering time and date of maturation of 3 varieties of wheat, NP165, C13 and Kubanka, at Bikaner, India. Flower initiation under continuous illumination was earlier (compared with natural day length) by 22, 31 and 64 days in the case of NP165, C13 and Kubanka, respectively. The 6 hr. photoperiod delayed flowering.—W.J.B.

- 32 ANDERSEN, S. **A method for determining stages of development in wheat.** *Physiol. Plant.* 1954, **7**, No. 3, 513-16, bibl. 4. [Roy. Vet. Agric. Coll., Copenhagen, Denmark]

The method described is based on Bonnett's studies of the development of the spike in wheat. From studies during 1949, 1952 and 1953, the following stages of development of the growing point and the spike were distinguished: (1) single leaf primordium, or none, (2) 2-3 leaf primordia (single ridges), (3) 4 or more leaf primordia, (4) transformation of leaf primordia to spikelet primordia (double ridges); the apices of the spikelet primordia are square-cut and stumpy, (5) apices of spikelets hemispherical, (6) empty glumes visible, (7) lemma visible, (8) anther initials visible, (9) awn on lemma in top spikelet, (10) awn longer than spikelet in 2 or more spikelets, (11) most spikelets covered by empty glumes and lemma, (12) all spikelets covered by empty glumes and lemma, (13) heading. As far as possible, these stages represent development periods of equal length; an average of 6 days was required for the plants to pass from one growth stage to the next. It was found very difficult to correlate these stages of development with leaf numbers.—P.J.B.

- 33 IRVINE, G. N. and others. **Note on the catalase activity of North American wheats.** *Cereal Chem.* 1954, **31**, No. 3, 267-70, bibl. 4. [Grain Res. Lab., Bd Grain Commissioners, Winnipeg, Canada]

- 34 BILLI, Luciana. **Attività transaminasica, amilasica, fosfataseica e contenuto in zuccheri**

riducenti nel corso della maturazione di cariossidi di *Triticum vulgare* cv. "Roma." [Transaminase, amylase and phosphatase activities and reducing sugar content during the maturation of caryopsides of *Triticum vulgare* cult. var. Roma.] *Ann. Sper. agr.* 1954, 8, No. 4, 1097-102, bibl. 3, English summary p. 1102. [Sta. Chim-Agr. Sper., Roma]

An account of investigations is given. [See also *Fld Crop Abstr.* 6 : 371.]—E.B.O.

35 PENCE, J. W. and others. Differences in the distribution of components in albumin preparations from durum and common wheat flours. *Cereal Chem.* 1954, 31, No. 5, 396-406, bibl. 14, illus. [West. Util. Res. Branch, U.S. Dep. Agric., Albany, California]

The components of the albumin of common and durum wheats are compared electrophoretically. Consistent differences between the albumin composition of two types of wheat are demonstrated and it is considered that they may be related to the relatively inferior baking quality of durum wheats.—P.J.B.

36 RANVIR SINGH. Effect of excessive nitrogenous manuring on the lodging and yields of wheat. *Curr. Sci.* 1954, 23, No. 6, 199-200, bibl. 4. [Dep. Agron., B.R. Coll., Agra, India]

Ammonium sulphate was applied to wheat in 1950-1 at the rate of nil, 15, 30, 45, 60, 75, 100 and 105 lb. N per ac., with and without farmyard manure at 20 lb. N per ac. The grain yield increased with increasing levels of N up to 60 lb. per ac. and yields of straw increased with increasing N up to the highest level. The grain yield at the 60 lb. level of N was 23.49 maunds per ac. [1 maund = 32.29 lb.] At rates of N application higher than 60 lb. per ac. lodging was severe. Where lodging occurred it caused an estimated loss in grain yield of 49%. The application of farmyard manure reduced the incidence of lodging on the plots receiving more than 60 lb. N per ac. as ammonium sulphate.—W.J.B.

37 PINGALE, S. V. and others. Effect of insect infestation on stored grain. 1. Studies on soft wheat. *J. Sci. Fd Agric.* 1954, 5, No. 1, 51-4, bibl. 16.

Soft wheat was subjected to infestation by 3 species of insects, *Calandra oryzae* (weevils), *Trogoderma granaria*, (Khapra beetles) and *Ephestia cautella* (almond moth). Weevils cause heavy reduction in the weight of grain, while the moth, which feeds only on the germ portion, considerably reduces the grain's viability. An increase in the fat acidity, and a decrease in the thiamine content due to insect damage, were both appreciable, but the effect on the nutrient content of the grain was not significant.—From authors' summary.

38 EL NAHAL, A. K. M. Fumigation of agricultural products. 8. Penetration and sorption of methyl bromide in wheat fumigated at reduced pressures. *J. Sci. Fd Agric.* 1954, 5, No. 8, 369-73, bibl. 9, illus. [Imp. Coll. Sci. Technol.]

Penetration of a sack of wheat by methyl bromide occurs readily at atmospheric pressure. Sustained-vacuum fumigation produced little improvement in penetration, but some increase in the residual fumigant was noted in this method. Vacuum fumigation with simultaneous admission of air and fumigant gave results in all material respects the same as were obtained by fumigation for the same period at atmospheric pressure. The "air-washing" procedure was found to be less effective than the low sorption of methyl bromide on wheat would suggest. Residual methyl bromide in vacuum-fumigated wheat has been investigated. The enhanced interstitial concentrations found in sacks of wheat fumigated under sustained vacuum with ethylene oxide and methyl bromide may be associated with desorption from wheat drying out under reduced pressures.—Author's summary.

39 PAGE, A. B. P. and BLACKITH, R. E. Fumigation of agricultural products. 9. Sorption of fumigants at reduced pressures. *J. Sci. Fd Agric.* 1954, 5, No. 8, 373-6, bibl. 19, illus. [Imp. Coll. Fld Sta.]

The sorption of fumigants by wheats and other seeds is known to depend on the concentration-time product attained at the place of sampling, and on the shape of the curve representing the rise and fall of fumigant concentration at that position. Though trials on a pilot scale suggested that reduced pressure influenced sorption, evidence from laboratory experiments was to the contrary. It has been shown that reduced pressures alone do not modify sorption.—From authors' summary.

OATS

40 NORTHERN IRELAND. Ministry of Agriculture. Reports from the counties. Oat variety trials. *Mon. Rep. Minist. Agric. N. Ire.* 1954, 29, No. 6, 176-7.

The varieties of oats for medium to high fertility soils on trial at Enniskillen in 1953 all gave satisfactory grain and straw yields. Abed Minor gave 27.5 cwt. of grain and 23.5 cwt. of straw per ac., while Svalöf Blenda gave 21.75 cwt. of grain and 24 cwt. of straw per ac. Of 5 varieties, for soil of low fertility at a high altitude, on trial at Derrylin in 1953, Ayr Line yielded 30 cwt. of grain and 37 cwt. of straw per ac. Bell gave low grain yields and tended to lodge.—M.P.

41 BUCHLI, M. Die Hafersorten des schweizerischen Richtsortimentes für den Getreide-

bau 1953. [Oat varieties of the Swiss standard collection for cultivation in 1953.] *Flugbl. A/3. Eidg. Landw. Versuchsanst. Zürich-Oerlikon* 1953, pp. 6, illus. [Eidg. Landw. Versuchsanst., Zürich-Oerlikon, Switzerland]

The most important cultivation characteristics and morphological features of recommended varieties which have been under trial at experiment stations for at least 3 years are described. These varieties are Adlikerhafer, Bisnachterhafer, Soldanelle, Brune de Mont-Calme, Petkuser Flämingsgold, Petkuser Flämingsstreu, Goldregenhafer II, Sonnenhafer II, Abed-Minorhafer, and Siriushafer II.—D.B.

- 42 GERVAIS, P. Quelles sont les meilleures variétés d'avoine pour les Cantons de l'Est? [Which are the best oat varieties for the eastern Cantons?] *Agriculture, Montréal* 1954, 11, No. 4, 12-14, illus. [Sta. Exp. Lennoxville, Québec]

Oats are the most widely grown cereal in the eastern Cantons of Quebec. The average grain yields per unit-area, obtained over the years 1940-53, from the principal varieties under trial in different localities in Quebec are tabulated. The general conclusion is that the variety Ajax, early and resistant to stem rust, is the best adapted to the region, its average yield in the trials being 73.5-90.4 bu. per ac. Other good varieties are Shefford, Beaver, Vanguard, Erban, Abegweit and Roxton.—E.B.O.

- 43 ARNY, D. C. and LEBEN, C. Vapour action of certain mercury seed treatment materials. *Phytopathology* 1954, 44, No. 7, 380-3, bibl. 11. [Pl. Path. Dep., Univ. Wisconsin, Madison]

In field trials, the use of Ceresan M and Panogen for treating oat seed infected with *Helminthosporium victoriae* resulted in significant grain yield increases, while the use of Agrox (6.7% phenyl mercury urea) and Setrete (7% phenyl mercuric ammonium acetate) did not. Ceresan M and Panogen were able to control *H. victoriae* infection of oat seed by vapour action alone.—P.J.B.

- 44 McLEOD, K. and others. "Tulip root" of oats in Durham. *Agriculture, Lond.* 1954, 61, No. 5, 229-31.

As far as is known, Milford is the only British variety of spring oat which shows resistance to attacks by the stem and bulb eelworm [*Anguillulina dipsaci*] (tulip root). The yields of grain from Milford, Opus, Eagle, Sun II and S.221, respectively, when grown in 1951 on land infested with stem and bulb eelworm, were 24.8, 14.07, 13.39, 10 and 7.16 cwt. per ac., while the percentage of

plants visibly attacked by the eelworm were 0, 51.2, 57.8, 71.3 and 66.4%, respectively. In Durham, where eelworm infestation frequently occurs, Milford has consistently shown its resistance to tulip root.—W.J.B.

- 45 EBERHARDT, F. Ausscheidung einer organischen Verbindung aus den Wurzeln der Hafer (*Avena sativa* L.). [Excretion of an organic compound from the roots of oats (*Avena sativa*).] *Naturwissenschaften* 1954, 41, No. 11, 259, bibl. 4. [Inst. PflSch., Landw. Hochsch., Hohenheim, W. Germany]

The excretion, by living roots, of a substance which fluoresces in ultra-violet light, has been demonstrated by oat seedlings, whether grown on filter paper, in distilled water, in sand culture or in moist air. The excretion is most pronounced from the root-hair zone, but it also occurs in the hairless zone. The substance has been identified as the lactone 7-oxy-6-methoxycumarine (scopoletin), together with its glucose, both already known to be present in the roots of oats. These observations are of interest in connexion with the problem of the source of physiologically active organic substances in the soil.—D.B.

- 46† BULA, R. J. and others. Measurements of light beneath a small-grain companion crop as related to legume establishment. *Bot. Gaz.* 1954, 115, No. 3, 271-8, bibl. 6, illus. [Wisconsin Agric. Exp. Sta., Madison]

Light measurements were made with an averaging instrument to obtain the percentages of solar radiation effective in photosynthesis that penetrated an oat companion crop to a level of 3 in. above the soil surface. The percentage of light decreased from 100%, when the oats had 3 or 4 visible leaves, to 20 or 30%, when the oat crop was fully headed. There was no marked difference in the light intensity measurements under 5 different varieties of oats, except that under Clinton the readings were usually higher. Rate of sowing (of Clinton) varied from 0.5 to 3 bu. per acre. Higher light-readings were obtained in plots with lower rates of sowing, until weeds increased in number and size and so reduced the light. Because a much greater weed population invaded the plots sown at the lower than at the higher rate, the shade from the canopy of oats and weeds eventually became nearly the same for all rates of sowing, and the percentage of light which penetrated became the same for all rates of sowing by the time the oat crop was fully headed (June/July). There was no significant difference in the density of the stand (counts) of lucerne and red clover plants when grown under different varieties of oats, or under the same oat variety at different rates of sowing.—D.B.

- 47 MAŠTAKOV, S. M. and others. [Increasing the stability of the stems of cereal grasses by applying 2,4-D.] [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR)* 1954, **96**, No. 4, 845-8, bibl. 9. [Inst. Improve. Marsh Lands, Acad. Sci. White Russia]

In 1953 the authors made tests with oats sown on 11 April on the peat-bog soil of the Minsk Experimental Station. 2,4-D was applied at a rate of 1 or 2 kg./ha. in aqueous solution so that the amount of fluid per ha. was 300 l. The treatment was applied at two different growth phases, the first at seedling emergence (6 May) and the second at the tillering/early-shooting stage (1 June). The plot size was 14 sq. m. and there were 4 replications. The treatment did not affect the initiation of the main growth stages, e.g. tillering, shooting, or panicle emergence, but spraying on 6 May produced an effect on the morphology of the plants, exhibited chiefly as a change in leaf form. In the case where leaves of the control were broad and drooping, those of the treated plants were narrow and up-turned. There were also certain physiological responses following treatment at this period, e.g. intensity of respiration was enhanced. Treatment of the plants at a later growth phase (1 June) had no effect on the plants. From an analysis made after 27 days of those plants treated on 6 May, the following differences (compared with controls) were noted: weight of 100 dried plants was 202.3 g. (treated) and 155 g. (control); weight of stems 118.5 g. (treated) and 94.2 g. (control); length of stems 90 cm. (treated) and 111.2 cm. (control); length of internodes (2nd, 3rd and 4th leaves respectively) 15, 15.5 and 11.2 cm. (treated) and 15.1, 17.2, 13.7 cm. (control). Because of this effect of 2,4-D in shortening stem length and increasing stem thickness (confirmed also by the authors' measurements of cellular tissues, reported) it is concluded that the treatment improves the resistance of stems to lodging. This is effected primarily because of the greater intensity of light falling on the crops which results from the change induced in leaf morphology and also from the suppression of weeds, with their shading influence. A study of yields made after the oats had ripened (on 10 August) showed that treatment at seedling emergence (6 May) with 2,4-D at a rate of 2 kg./ha. lowered grain yield (16 mg./100 sq. m. compared with 18.9 in controls), while a rate of 1 kg./ha. produced an increase in 1000-grain weight (15.39 compared with 13.60 in controls). It is recommended that further tests should be made regarding dosage, time and conditions of application of 2,4-D to grain crops.—M.H.

RYE

- 48† KLEY, F. K. van der. Groenvoederwinning van roggegewassen die tevens voor zaad-

winning dienen. [Obtaining green fodder and grain from the same crop of rye.] *Landbouwk. Tijdschr., Wageningen* 1954, **66**, No. 8, 521-3, illus.

A preliminary account is given of an experiment in 1952-3 to determine the yields of green fodder and grain obtained from the same crop of rye when cut for green fodder in December, April, or at both dates, before the final harvest of grain. Cutting in April reduced, but cutting in December did not reduce, the yield of grain compared with no cutting before harvest. The greatest total yield of dry matter from green fodder and grain was obtained by cutting in December and April; in this case the yield of grain was much reduced. The economic implications of the experiment are discussed.—W.J.B.

- 49 WAGENINGEN. Rijksinstituut voor Ras-sonderzoek van Landbouwgewassen. Bericht over rassenkeuze No. 171. Winterrogge, 1954. [Choice of varieties. Pamphlet No. 171. Winter rye, 1954.] *Suppl. 19. LandbVoorl.* 1954, **11**, No. 9.

The results are given of interprovincial trials, 1949-54, with the winter-rye varieties Petkuser, Brandt's Marien, Dominant, Heertvelder (resistant to stem eelworm), S.Y.25 and Carsten's Kortstro. Dominant gave grain yields equal to, or slightly better than, those of Petkuser (the variety most commonly grown in the Netherlands) on all soil types.—W.J.B.

- 50 ELLERSTROM, A. and HAGBERG, A. Competition between diploids and tetraploids in mixed rye populations. *Hereditas, Lund* 1954, **40**, No. 3/4, 535-7, bibl. 3. [Svalöf, Sweden]

- 51 HINTZER, H. M. R. and de MIRANDA, H. Investigations on the quality of diploid and tetraploid rye for breadmaking. *Cereal Chem.* 1954, **31**, No. 5, 407-16, bibl. 14, illus. [Cereal Dep., Cent. Inst. Nutr. Res., T.N.O., Wageningen, Neths]

The baking quality of 8 varieties of diploid rye grown at 6 locations in the Netherlands in 1948, was negatively correlated with maltose value and amylase activity, and positively correlated with maximum viscosity as recorded by the amylograph and with other properties associated with sprouting. Differences between locations were large, but small between varieties. Tetraploid rye had a higher protein content, a lower alpha-amylase activity and a superior baking quality to diploid rye. Tetraploid rye appeared to be more resistant to sprouting than diploid rye.—From authors' summary.

BARLEY

- 52 COOK, L. J. **Barley production in South Australia.** *J. Dep. Agric. S. Aust.* 1954, **57**, No. 9-10 and 11-12, 355-66, 393, 410-21, bibl. 10, illus.

Wheat and barley production in the State are compared and tables give production figures for the last 20 years. The amount of barley grown is on the increase, whereas the amount of wheat grown has decreased.—M.P.

- 53 EDINBURGH AND EAST OF SCOTLAND COLLEGE OF AGRICULTURE Field Experiments Committee. **A report on seven years' experimentation with barley varieties, 1946-1952.** *Tech. Bull. 9. Edinb. E. Scot. Coll. Agric.* 1954, pp. 20.

Results of trials with spring- and winter-varieties are fully tabulated: varietal notes are given. Yields, maturity, straw-length and straw-strength were compared. Of the 23 spring varieties on trial, Ymer was used as the control. In 3 trials, however, Plumage Archer was used as control. Ymer was very satisfactory but was outyielded by Drost, Nordgaarden 56 and Rika. Danish Archer yielded best of the Archer-type barleys. Freja, Kenia and Nordgaarden ripened slightly earlier, and the Archer types later than Ymer. Of the three winter varieties, Pioneer and Spratt Archer gave similar yields, and both yielded more than Plumage Archer. Pioneer ripened first and had a straw-strength intermediate between that of the other two.—M.P.

- 54 REPUBLIC OF IRELAND. Ministry of Agriculture. **Twenty-second annual report of the Minister of Agriculture 1952-53.** *Rep. Republ. Ire. Minist. Agric.* [n.d.], pp. 195, append. + index pp. 89. [Received May, 1954]

A series of barley trials was carried out at the Cereal Station, Ballinacurra (pp. 90-3). Of the 25 varieties in one trial, Spratt-Archer × Kenia selections 102, 131, and 70 significantly outyielded Beorna. In another trial Carlsberg, Proctor, and Kenia × Plumage-Archer 35/99/3/3, all outyielded Spratt Archer × Kenia 22/16. Spratt-Archer × Kenia 22/11 significantly outyielded Beorna. In the European Brewery Convention trial, of the varieties grown in Ireland, Carlsberg yielded the highest, and significantly more than Beorna, Kenia or Earl. Carlsberg and Beorna are both dual-purpose varieties.—M.P.

- 55 WAGENINGEN. Rijksinstituut voor Rassonderzoek van Landbouwgewassen. Bericht over rassenkeuse No. 170. Wintergerst, 1954. [Choice of varieties. Pamphlet No. 170. **Winter barley, 1954.**] *Suppl. 18. LandbVoorl.* 1954, **11**, No. 9.

Comparative interprovincial trials with the varieties of winter barley: Urania, Vindicat, Vinesco, Trias, Atlas and Herfordia, are reported. Urania has occupied about 90% of the area sown with winter barley in the Netherlands in recent years. Vinesco outyielded Urania on all soils except sea-clay.—W.J.B.

- 56 BUCHLI, M. Die Wintergerstensorten des schweizerischen Richtsortimentes für den Getreidebau 1953. [**Winter barley varieties of the Swiss standard collection for the 1953 cultivation season.**] *Flugbl. A/4. Eidg. Landw. Versuchsanst. Zürich-Oerlikon* 1953, pp. 5, illus. [Eidg. Landw. Versuchsanst., Zürich-Oerlikon, Switzerland]

The cultivation characteristics of the varieties Riniker, Argovia M, Salemer (six-rowed), and Gembloux 456 are described.—D.B.

- 57 BUCHLI, M. Die Sommergerstensorten des schweizerischen Richtsortimentes für den Getreidebau 1954. [**Varieties of spring barley from the standard lists for 1954 cereal cultivation.**] *Mitt. schweiz. Landw.* 1954, **2**, No. 7, 121-5, illus. [Eidg. Landw. Versuchsanst., Zürich-Oerlikon]

In the Swiss standard list of varieties for cereal cultivation in 1954, 4 varieties of spring barley are recommended for multiplication, viz. Isaria, Kenia, Freja, and Herta. An account is given of the source, genetic origin, morphology, cultivation characteristics and disease resistance of each.—D.B.

- 58 BUCHLI, M. Anbauversuche mit Wintergerstensorten, 1951-1954. [**Cultivation trials with varieties of winter barley, 1951-1954.**] *Mitt. schweiz. Landw.* 1954, **2**, No. 8, 156-60, illus. [Landw. Versuchsanst., Zürich-Oerlikon]

The varieties on trial were Bordia, Vindicat, Peragis strain 12, Dea and Urania, all of foreign origin, with the native Riniker as a control. The time of maturation, straw-strength, grain- and straw-yields were studied. Dea yielded significantly better than all other varieties, at 4760 kg. of grain, and 5130 kg. of straw per ha. Riniker also gave the high yield of 4200 kg. grain per ha. Urania was the lowest yielder. Details of the new variety Dea are given. It is fairly early maturing and has good straw strength, but its resistance to disease is not fully known. Dea is recommended for growing in Switzerland.—M.P.

- 59 JENSEN, N. F. **Hudson, a hardier winter barley for New York.** *Fm Res.* 1954, **20**, No. 3, 14-15, bibl. 1, illus. [Cornell Univ. Agric. Exp. Sta., Ithaca, N.Y.]

Hudson, a 6-rowed, winter barley, was produced from a Michigan Winter × Wong cross. In 7 years' tests in New York State, the yields of Wong and

Hudson averaged 41.7 and 54.6 bu. per ac., with an average test weight per bu. of 46 and 49.4 lb., respectively. Hudson is superior to Wong in winterhardiness and is equally stiff-strawed.—P.J.B.

60† FAWZY, H. and others. **The influence of hydrogen ion concentration on cation absorption by barley roots.** *Pl. Physiol.* 1954, **29**, No. 3, 234-7, bibl. 5, illus. [Coll. Agric., Univ. Calif., Berkeley]

The effect of hydrogen ion on the absorption of K in root tissues and the modifications of this effect caused by Ca and other polyvalent cations has been studied.—D.B.

61 HUSSEY, G. and GREGORY, F. G. **The effect of auxin on the flowering behaviour of Wintex barley and Petkus rye.** *Pl. Physiol.* 1954, **29**, No. 3, 292-6, bibl. 14, illus. [Imp. Coll. Sci. Technol., London]

In the experiments reported there was no evidence that injected auxin (α -naphthaleneacetic acid) had any determinable effect on flower initiation in these plants. In Petkus rye, the flowering behaviour was not affected, and in Wintex barley the slight improvement in flowering, in 2 out of the 4 experiments, could be interpreted as a post-initiation effect.—D.B.

62 LANGSTON, R. and LEOPOLD, A. C. **Effect of photoinduction upon some B-vitamins in barley.** *Physiol. Plant.* 1954, **7**, No. 3, 397-404, bibl. 21. [Indiana Agric. Exp. Sta., Lafayette]

Wintex barley, a long-day variety, was subjected to 18 hr. photoperiods when the second leaf was fully mature, to bring about floral induction. Analyses of the mature leaves for biotin, niacin, pantothenic acid and riboflavin were made 21 days after the plants were subjected to 1 up to 7 photoinductive cycles of 18 hr. Almost all induction of floral primordia took place between the 2nd and 4th photoinductive cycles. After 3 photoinductive cycles, the biotin content of the leaves fell to a value 34% below that in the leaves of plants maintained in a vegetative condition, and, thereafter, rose almost to the original value by the 7th cycle. The niacin content of the leaves followed an irregular course, but was 27% below the value for plants in a vegetative state after 7 photoinductive cycles. The pantothenic-acid content fell 62% below that of plants in the vegetative state, and, thereafter, remained relatively constant. It was concluded that biotin is converted by photoinductive treatments to a less soluble compound, which may be related to the photoinductive process, while pantothenic acid is either translocated from the leaves, or destroyed. The reduction in niacin content is thought to be due to

the change in the amount of light reaching the plants, consequent on their being placed under a photoinductive regime, and not to involvement in some phase of the photoinductive process.—P.J.B.

63 ANDERSEN, S. **Effects of 2,4-D on ear development in barley.** *Physiol. Plant.* 1954, **7**, No. 3, 517-22, bibl. 15, illus. [Roy. Vet. Agric. Coll., Copenhagen, Denmark]

In trials during 1951 and 1952, barley was treated with 4 kg. of 2,4-D Na salt per ha. to determine the effect of 2,4-D on the formation of growth abnormalities in the very young barley spike and on the rate of growth of the plants. In 1951, the plants were sprayed on either 19 or 22 May and the spikes analysed for abnormalities over the period 20 May to 11 June, corresponding with leaf numbers of 2.52 to 5.24 in untreated plants. In 1952, plants were sprayed on 26 April and analysed for abnormalities over the period 26 April to 28 May, with corresponding leaf numbers ranging from 2.08 to 4.97. In neither experiment was the leaf number affected by the 2,4-D treatments. Spikelet development was greatly retarded by the treatment, and not until 3-4 weeks had passed was the stage of spikelet development similar in treated and untreated plants. Abnormal nodes in all cases were at a younger stage of development at a given date after treatment than were untreated nodes. Nodes which were injured by the 2,4-D grew almost as well as did other, uninjured, parts of the spike, but differentiation ceased for a time. Notes are given on the type of malformations induced in the spike by 2,4-D.—P.J.B.

64 SKAZKIN, F. D. and CVETKOVA, N. N. **[The effect of nitrogen on barley at different developmental periods with deficient water in the soil.]** [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR)* 1954, **97**, No. 3, 539-42, bibl. 4, illus. [Leshaft Nat. Sci. Inst., Acad. Pedagog. Sci., RSFSR]

It has been established that potassium, phosphorus and boron alleviate the adverse effect on cereal grasses of water deficiency in soils. There is, however, little information on the effect of nitrogen on grasses at different stages of development when the crops are grown on water-deficient soils. To study this problem, two barley varieties (Viner, which requires a good supply of moisture, and Spartan, which is drought-resistant) were grown in culture vessels and given normal NPK plus a double dose of N at: (1) the vernalization stage; (2) at the light stage of development (=period of initiation of flower organs in developing spikelets); and (3) at the so-called critical period (from the time of tetrad formation in sporogenesis to earing). At each phase when the double dose of N was available, the soil moisture varied between 20 and

60% of full moisture-holding capacity. After these periods the moisture was maintained at 60% of full moisture-holding capacity. The controls were grown without the double N supply and, during the whole period, soil moisture of the controls was at 60% of the full capacity. The data show that with adequate moisture, the most beneficial effects of additional N supplies are produced during the light stage of development (total grain yield for Spartan being 610% compared with 100% in control; and for Viner 334% compared with 100% control). Additional N given at the critical period resulted in the production of infertile tillers. With deficient moisture, the best results in grain yield were produced when additional N was supplied at the light stage, the figures being 540% and 327%, respectively, for the two varieties Spartan and Viner, compared with 100% in the two controls.—M.H.

MAIZE

- 65 BECKER, W. R. De invloed van de zaaitijd op de ontwikkeling en opbrengst van de mais. [The influence of sowing date on the development and yield of maize.] *Landbouwk. Tijdschr., Wageningen* 1954, **66**, No. 8, 524-8, illus.

Goudster and Wisconsin 240 maize were sown in 1952-3 on sandy soils, and, in 1953, on a clay soil, at intervals of 9 days from 1 April to mid-May. On sandy soil in 1952 there was little difference between the grain yield of crops sown between 1 and 28 April, but there was a marked fall in grain yields from crops sown after 28 April. In 1953, on the same soil, yields from crops sown on 1 and 10 April were very low owing to frost damage, maximum yields were obtained from crops sown on 28 April and there was a decline in yields from crops sown after that date. In 1953 on a clay soil, the maximum yield was obtained from the 19 April sowing. Within the limits of the experiment the vegetative portions of the plants were increasingly tall and bulky with progressively later sowing dates. It is concluded that sowing should take place within the period 20 April to beginning of May.—W.J.B.

- 66 FROMONT, P. L'extension de la culture du maïs et ses problèmes. [The extension of maize cultivation and its problems.] *C.R. Acad. Agric. Fr.* 1954, **40**, No. 12, 445-51.

The author reports on the progress made following the introduction of American hybrids, especially the extension of the area under maize north of Paris and its cultivation as a "family" proposition rather than as a large-scale undertaking.—D.B.

- 67 KULESHOV, N. N. Some peculiarities of maize in Asia. *Ann. Mo. bot. Gdn* 1954, **41**, No. 3, 271-99, bibl. 14, illus.

This is a translation from the Russian of a paper which appeared in *Bull. appl. Bot., Genet., Pl. Breed.* 1928, 19, 325-74, English summary pp. 370-4. The translators, H. J. Kidd and H. C. Reynolds, state that the paper contains the only extensive studies of maize in the Orient and is of particular interest in view of recent findings concerning the geography of races of maize.—D.B.

- 68† ENGLAND AND WALES. Ministry of Agriculture and Fisheries. Maize for fodder and silage. *Adv. Leaflet* 94. *Engla andnd Wales. Minist. Agric. Fish.* 1954, pp. 4.

- 69† MUSIŨKO, A. S. [New varieties of maize for silage.] [Russian] *Doklady Vsesojuz. Akad. S.-H. Nauk (Proc. Lenin Acad. agric. Sci.)* 1954, **19**, No. 4, 14-17, illus.

The value for silage is recorded of the maize varieties Odesskaja 10 [green weight obtained in the southern Ukraine = 50,000-60,000 kg./ha.] and Gruševskaja Odesskaja [green weight, average over 3 years, in Odessa Province = 29,700 kg./ha.].—M.H.

- 70† SCHNELL, W. Über die Anbaueignung von Maishybriden und -sorten. [The suitability of maize hybrids and maize varieties for cultivation (in Western Germany).] *Z. Acker- u. Pflbau* 1954, **98**, No. 1, 1-24, bibl. 65. [Max-Planck-Inst. für Züchtungsforschung, Scharnhorst, W. Germany]

There has recently been a renewed interest in Western Germany in the cultivation of maize, particularly for fodder. This paper gives the most important results of variety trials, carried out during 1950-2, with seed of known pedigree provided by FAO. The trials were conducted in the Rhine land and in the central and southern parts of Western Germany. Comparisons were made between introduced hybrids and established German varieties which ripened at the same time. In the fodder-maize trials, the only hybrids which gave higher yields than the German varieties were: in the medium-late group, hybrids Wis. 270 and Wis. 275A; in the late groups, Wis. 355 and Wis. 341A; and in the very late group Wis. 525. The yield of dry matter in these hybrids was, on an average, only 9% higher than in the established German varieties. On the other hand, the difference in yield shown by the different time-of-ripening groups was so great that the most important question was to decide on the most suitable time-of-ripening group. In cob-maize trials, the average increase in yield of hybrids over German varieties was, for similar ripening groups, 18%. Hybrids recommended for cultivation for grain are the medium-early hybrid

Wis. 240 and the medium-late Wis. 255 and 270. Hybrids suitable for the climatically less favourable parts of Germany are being sought from among the early-ripening group.—D.B.

- 71 KAVANAGH, L. R. **Maize. 1954-55 sowing recommendations.** *Agric. Gaz. N.S.W.* 1954, **65**, No. 5, 234-7.

Hybrid strains and open-pollinated varieties are listed. Short descriptive notes on the hybrids are given.—M.P.

- 72 ROSSMAN, E. C. **Michigan 570—a new corn hybrid.** *Quart. Bull. Mich. agric. Exp. Sta.* 1954, **36**, No. 4, 386-90, bibl. 3.

Michigan 570 is a new, 110-day relative maturity maize hybrid, which is widely adapted in southern Michigan for both grain and silage production. In trials in southern Michigan, no other hybrid has exceeded Michigan 570 in yield, and its resistance to lodging has been very good.—P.J.B.

- 73 WELLHAUSEN, E. J. **Modern corn breeding and production in Mexico.** *Phytopathology* 1954, **44**, No. 8, 391-5. [Rockefeller Found. Agric. Program, Londres, Mexico, D.F.]

Observations are made on the present situation in Mexico relative to maize production and on current projects for the introduction of hybrid and synthetic strains into Mexican agriculture.—J.B.

- 74 ELLIS, R. T. **Report on the incidence of *Puccinia polysora* maize rust in Nyasaland during the growing season 1953/54.** *Nyasaland Fmr For.* 1954, **2**, No. 2, 48-52. [Agric. Res. Sta., Lilongwe]

During the 1953-4 growing season, *P. polysora* was confirmed in only a few localities. It appears that the stage of maturity of the host affects the incidence of the disease. The use of the fungicide milbane reduced the incidence of the disease and spraying significantly increased the yield of southern Rhodesian Hybrid maize, but not of Kamalenga or the local flint.—M.P.

- 75 LILLY, J. H. **Insecticidal control of the corn rootworm [*Diabrotica longicornis*] in 1953.** *J. econ. Ent.* 1954, **47**, No. 4, 651-8, bibl. 1, illus. [Iowa State Coll., Ames]

- 76 BURKHARDT, C. C. **Chemical control of the western corn rootworm in Kansas in 1953.** *J. econ. Ent.* 1954, **47**, No. 4, 691-6, bibl. 6, illus. [Kansas Agric. Exp. Sta., Manhattan]
- 77 Aldrin, Heptachlor and Lindane, applied by band treatment to maize plots at sowing time, each at the rate of 0.25 and 0.5 lb. of actual toxicant per ac., and Chlordane applied under the same conditions at the rate of 0.5 and 1 lb. per ac., reduced

considerably the number of larvae of the corn rootworm (*Diabrotica virgifera*) and the amount of plant lodging. There were no important differences between the higher and lower rates of application. In one series of trials the larval counts were, on an average, 5.6 per plant in the treated plots, compared with 76 in the untreated plots. Plant lodging was 0.33% in the treated plots compared with 29% in the controls. Yields from the treated plots almost doubled those from the untreated plots.—E.B.O.

- 77 ANGLADE, P. **Essais de lutte chimique contre la noctuelle des moissons *Euxoa segetum* Schiff nuisible au maïs dans le sud-ouest. [Trials in the chemical control of the harvest night moth, *Euxoa segetum*, harmful to maize in the south-west (of France).]** *C.R. Acad. Agric. Fr.* 1954, **40**, No. 13, 525-8.

The following sprays provided the best control measures against the larvae of *Euxoa segetum*; 0.4 g. DDT plus 0.08 g. Lindane; 0.4 g. DDT oil emulsion; 0.4 g. Chlordane and 0.2 g. Aldrin, if applied at the onset of the attack. Applications of insecticides with the maize seed at sowing was a good preventive measure. The controls showed 14% attack, whereas 0.25 g. of Aldrin per m. reduced the attack of 1.8%. The younger the larvae the better the results with the insecticides.—M.P.

- 78 ABBE, E. C. and STEIN, O. L. **The growth of the shoot apex in maize: embryogeny.** *Amer. J. Bot.* 1954, **41**, No. 4, 285-93, bibl. 10, illus. [Univ. Minnesota, Minneapolis]

The dimensional changes of the shoot apex are traced through embryogeny in an inbred strain of *Zea mays*. The results of this investigation are compared with similar processes during seedling growth in maize. The constancy of cell size appears common to both phases of plant growth as well as the general increase in shoot apex size from stage to stage. However, the rates of increase in shoot apex size and cell number, as well as rate of leaf initiation, are diametrically opposed in the two phases, being deceleratory during embryogeny and acceleratory during seedling growth. [See also *Fld Crop Abstr.* 5 : 769.]—From authors' summary.

- 79† LEDIN, R. B. **The vegetative shoot apex of *Zea mays*.** *Amer. J. Bot.* 1954, **41**, No. 1, 11-17, bibl. 32, illus. [Univ. Florida]

The purpose of this paper is to present a study and interpretation of the vegetative shoot apex of *Zea mays* in the light of the tunica-corpus theory and the meristematic zonation of the corpus, and to study the origin of the leaves and axillary buds from the terminal meristem.—Extract.

- 80 STEIN, O. L. and WEBER, A. V. **Comparison of two methods of analysis of rate of leaf**

initiation in *Zea mays* L. *Science* 1954, **120**, No. 3119, 574-5, bibl. 4. [Bot. Dep., Univ. Minnesota, Minneapolis]

Data are given comparing the mid-point and stage-per-day methods of determining the rate of leaf initiation in maize. The advantages of the stage-per-day method over the mid-point method are discussed.—P.J.B.

- 81 ROBINS, J. S. and DOMINGO, C. E. **Some effects of severe soil moisture deficits at specific growth stages in corn.** *Agron. J.* 1954, **45**, No. 12, 618-21, bibl. 4. [Irrigation Exp. Sta., Prosser, Washington]

Maize was grown under conditions in which the plants were irrigated: (a) at the tassel stage and on 0, 1 or 2 occasions subsequently, (b) after wilting for 1-2, or 6-8 days at the tassel stage, followed by one or two subsequent irrigations, (c) after wilting for 1-2 days at the pollen-shedding stage, followed by one or two subsequent irrigations, or (d) at the tassel stage after the plants had approached the wilting point, followed by 3 further irrigations. There were no significant grain-yield differences between crops grown on plots from which all available soil moisture had been removed at 7 weeks after tasselling, and those grown in conditions of ample moisture until the crops were harvested. Yields were significantly reduced where the available soil moisture was removed at about 4 weeks after tasselling. From these results, it was apparent that for maximum yields ample soil moisture was needed only until the grain was ripe, and not after. Treatment which entailed removal of soil moisture at tasselling (wilted for 6-8 days at tasselling, followed by 1 or 2 irrigations) resulted in highly significant lower grain yields than where the crops were irrigated at the tassel stage, followed by 1, 2 or 3 irrigations. Yield reductions caused by wilting at tasselling were partly due to reduced fertilization, owing to non-receptive silks, and partly to reduced ear size. Data are given of water use under the different treatments. Water use ranged from 12.7 acre-in. for crops irrigated at tasselling only, to 22.6 acre-in. for crops irrigated at tasselling and given 3 subsequent irrigations. Water use of crops wilted for 6-8 days at tasselling and irrigated once and twice afterwards was 15.9 and 19.5 acre-in., respectively, these lower values being largely due to reduced plant size.—P.J.B.

- 82 CAMERON, J. W. and TEAS, H. J. **Carbohydrate relationships in developing and mature endosperms of brittle and related maize genotypes.** *Amer. J. Bot.* 1954, **41**, No. 1, 50-5, bibl. 12. [Univ. Calif. Citrus Exp. Sta., Riverside (J.W.C.), and Calif. Inst. Technol., Pasadena (H.J.T.)]

[See also *Fld Crop Abstr.* 7 : 1177.]

- 83 FLYNN, Laura M. and others. **Relation between protein content of corn and concentration of amino acids and nicotinic acid.** *Cereal Chem.* 1954, **31**, No. 3, 217-28, bibl. 33. [Missouri Agric. Exp. Sta., Columbia]

Assays were made of samples of low-protein (average 9.9%) and high protein (average 14.3%) maize grain. From microbiological tests, the contents of tryptophan, lysine, methionine and nicotinic acid in low-protein grain averaged 8.314, 199 and 2.53 mg.%, and in high-protein grain, 99, 380, 239 and 2.4 mg.%, on a dry-matter basis respectively. As determined by chemical analysis, the content of cystine in low- and high-protein grain averaged 144 and 182 mg. %, respectively. The average amount of tryptophan, lysine, methionine, cystine and nicotinic acid per g. of protein in the low-protein grain was 8.9, 31.1, 20.3, 14.6 and 0.26 mg. and in the high-protein grain, 6.9, 26.6, 18.1, 12.8 and 0.17 mg., respectively. Data are given of the zein content of the protein of grain from plants grown under different N treatments and of different varieties. Increases in the content of crude protein in the grain, whether genetically or nutritionally conditioned, were paralleled by increases in the percentage of zein in the crude protein. The practical aspects of changes in the composition of crude protein which accompany increases in the protein content of maize grain are discussed.—P.J.B.

- 84 SOUTHERN RHODESIA. Research and Specialist Services. **Annual Report of the Director for the year ending 30 September, 1953.** Salisbury, 1954, 15-16.

A series of maize experiments was carried out at the Salisbury Experiment Station. It was found that maize yields in variety trials planted on land where a wide rotation was practised averaged 9 bags per ac. [1 bag = 200 lb.] more than was obtained where an alternating rotation of maize and velvet beans (for green manure) was used. Single-hybrid strains yielded more than double-hybrid strains and open-pollinated varieties. The addition of nitrogenous fertilizers increased yields; 150 lb. nitrate of potash per ac. increased the yield by 3.7 bags. The protein content of both high- and low-yielding maize varieties was raised by the addition of nitrate of soda. Where the soil is N-deficient, an increased yield from single-hybrid maize resulted in a lower percentage of protein in the grain. When sulphate of ammonia was applied to maize grown as the first crop after a grass ley, the yield was 18.5 bags per ac., or treble that from unfertilized land.—M.P.

- 85 OLAFSON, J. H. and others. **Grain storage studies. 15. Influence of moisture content, commercial grade, and maturity on the respiration and chemical deterioration of**

corn. *Cereal Chem.* 1954, **31**, No. 4, 333-40. [Minnesota Agric. Exp. Sta., St. Paul]

Data are given showing that immature maize grain, or maize grain that has suffered kernel damage, respire more rapidly than mature, sound grain, stored at the same moisture content.—P.J.B.

- 86 LE PELLEY, R. and KOCKUM, S. **Experiments in the use of insecticides for the protection of grain in storage.** *Bull. ent. Res.* 1954, **45**, No. 2, 295-311, bibl. 15. [Dep. Agric. Kenya]

Results from 5 experiments to test various insecticides for controlling the rice weevil (*Calandra oryzae*) in stored maize indicated that: (a) γ BHC at 1 ppm. was completely effective for 16 months; (b) pyrethrum powder at 25 ppm., or over, gave good control for 10 months; (c) pyrethrin-piperonyl butoxide mixtures were effective for 6 months, but the content of active insecticide used was too low for effective control over a longer period; (d) Kenya diatomite reduced the weevil damage to grain; (e) the conditioning process alone reduced damage during an 8-month period.—From authors' summary.

- 87 OSMUN, J. V. **Protection of stored shelled corn with a protectant dust in Indiana.** *J. econ. Ent.* 1954, **47**, No. 3, 462-5, bibl. 5. [Agric. Exp. Sta., Purdue Univ.]

Maize grain treated with Pyrenone Protectant T-483 (1-10% piperonyl butoxide, 0-08% pyrethrins and maize cob flour carrier) and stored in 2 standard metal bins was compared with untreated maize. The insecticide was used at the rate of 75 lb. per 1000 bu. of maize. Additional amounts were given to the floor of each bin before introducing the maize, and, after the bins were filled, to the top layer of maize. A highly significant difference was noted between treated and untreated maize. The maize below the surface layer in the treated bins remained free of heavy insect infestation during a 2-year period. The surface became only moderately infested during the later months of the trial.—E.B.O.

MILLETS AND SORGHUM

- 38 SWANSON, A. F. and others. Investigaciones sobre sorgo en la estación experimental agrícola de "La Molina" 1952-53. [Trials with sorghum at La Molina Research Station, 1952-53.] *Informe 87. Esta. exp. Agric., Peru* 1953, pp. 13, illus., English summary p. 13.

A preliminary report is made on trials with numerous sorghum varieties from Africa and the USA. Seeds sown in February (the hottest month) and harvested in May-June gave yields of grain

varying from 2 to 4 metric tons per ha. Losses from bird attacks were severe. Plants from seeds sown in July (temperature less than 15°C.) usually failed to set seed. Plants failed to form viable pollen during the winter months (June-November) when temperatures were less than 18°C., but vegetative growth continued, although slowly, during the winter months. Forage varieties of sorghum gave good yields of green material whether grown in winter or summer. Good results were obtained when sorghum was grown on irrigated land.—W.J.B.

- 89 JONES, K. W. **A note on damage to dura (*Sorghum vulgare* Pers.) by hormone weed-killers.** *E. Afr. agric. J.* 1954, **19**, No. 4, 237-8, illus. [Minist. Agric., Sudan Govt, Gezira Res. Fm]

Work at the Gezira Research Farm has shown that sodium 2,4-D, when used as a herbicide, kills the roots of dura. Prop-roots subsequently develop, but recovery of the plant occurs only when these roots can penetrate the soil. Spraying at a concentration of not more than 1 lb. per ac. should not be carried out earlier than two weeks after sowing. Care should be taken to avoid spraying when the soil is parched or liable to become waterlogged.—M.P.

- 90 SACCAS, A. M. Les champignons parasites des sorghos (*Sorghum vulgare*) et des pénicillaires (*Pennisetum typhoideum*) en Afrique équatoriale française. [The fungi parasitizing sorghum (*Sorghum vulgare*) and pearl millet (*Pennisetum typhoideum*) in French Equatorial Africa.] *Agron. trop.*, Nogent 1954, **9**, No. 2 and 3, 135-73, 263-301, respectively, illus. [Sta. Cent. Boukoko, Afr. Equat. Fr.]

Control measures are given.—E.B.O.

- 91 NARAYANASWAMI, S. **The structure and development of the caryopsis in some Indian millets. 3. *Paspalum scrobiculatum* [Koda millet].** *Bull. Torrey Bot. Cl.* 1954, **81**, No. 4, 288-99, bibl. 13, illus. [Bot. Dep., Delhi Univ., Delhi, India]

- 92† VARENICA, E. T. [Experiments on the cultivation of *Setaria viridis* in the non-chernozem belt.] [Russian] *Zemledelie (Agriculture)* 1954, **2**, No. 5, 62-73, illus.

Cultural measures for the growing of varieties of this crop for grain and green feed in the Moscow area and other regions of the non-chernozem belt are recorded.—M.H.

RICE

- 93 GRIST, D. H. **Rice in British Guiana.** *World Crops* 1954, **6**, No. 9, 367-71, illus.

Details are given of rice-growing schemes and methods of rice cultivation in the coastal area of British Guiana. In many areas two rice crops are grown per year, the first harvested in September-October and the second planted in November-December and harvested in March-April. The average yield of unhusked rice in British Guiana is 2460 lb. per ac. (1700 lb. from the autumn crop and 760 lb. from the succeeding spring crop). Higher yields are obtained where the crop is transplanted than where it is not. The mechanized cultivation of rice, under a Government-sponsored scheme, on over 11,000 ac. of low-lying land between the Mahaicony and Abary rivers, is described.—W.J.B.

- 94 ADAIR, E. O. **Rice production in the United States.** *World Crops* 1954, **6**, No. 9, 363-6, illus.

The principal rice growing areas of the USA are described and the experimental stations which serve these areas are listed. A description is given of the methods used in the growing of rice on irrigated land. The amount of irrigation water used varies from 2.5 to 2.75 acre-ft. in the Southern States and from 4 to 8 acre-ft. in California. Requirements of N (usually applied as ammonium sulphate) vary from 40 to 80 lb. per ac. Common rotations used are : Louisiana and Texas, 1-3 years' grass/1-2 years' rice ; Arkansas, rice rotated with oats, lespedeza and soyabeans ; California, rice/fallow/wheat or barley. Most rice is harvested by combines. When the grain is harvested it contains 20-25% moisture which is reduced to 13-14% in the drier.—W.J.B.

- 95 VINCENT, V. **The cultivation of floodland (paddy) rice.** *Rhod. agric. J.* 1954, **51**, No. 4, 287-92, illus.

Advice is given for Rhodesian farmers who are considering the cultivation of rice, with special reference to the Mazoe Valley where there is a 5-months growing season and an average summer rainfall of 32 in. p.a. The best yielding varieties are Vari Lava giving 4600 lb. of paddy per ac. and Angola Crystal yielding 5000 lb. per ac. The culture of fish in paddy fields is advocated ; *Tilapia mossambica* yields over 200 lb. of fish per ac.—M.P.

- 96 PIACCO, R. L'irrigazione delle risaie. 2. Distribuzione delle temperature massime dell'acqua. [**The irrigation of rice-fields. 2. Distribution of water of maximum temperature.**] *Ital. agric.* 1954, **91**, No. 6, 455-64. [Sta. Sper. Riscolt., Vercelli, Italy]

[See *Fld Crop Abstr.* 7 : 90.] Low temperature of irrigation water is associated with a smaller development of the rice plant and lower yields. In this second contribution, the variations of water temperature in the different parts of rice-fields, and

the causes of these variations, are examined. The temperature of the water at the inlet is generally lower than at the outlet. In the majority of the cases studied the irrigation water was shown to cover, on an average, 23.6% of the area of the field (direct-sown fields), before it reached its highest temperature. This value is 15% in the case of nurseries and probably about 30% in cases of fields with very porous soils. When the maximum temperature is reached, this is generally maintained until the water reaches the outlet.—E.B.O.

- 97 TAGLIOLI, E. Il trapianto meccanico del riso. [**The mechanized transplanting of rice.**] *G. Agric. Domen.* 1954, **64**, No. 31, 243, illus.

The practice of transplanting rice was introduced into Italy in 1914 and has gradually spread. In 1953 it was carried out, all by hand, on 45% of the rice area. Information is given on the first successful machine for transplanting rice in Italy which was officially tested this year. It is tractor drawn and can plant 3.4 ha. per day with the assistance of 4 men.—E.B.O.

- 98 KASAHARA, Y. and KINOSHITA, O. **Studies on the control of the barnyard grass in the paddy field.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1954, **22**, No. 3-4, 7-10, English summary p. 8. [Ohara Inst. Agric. Res., Okayama Univ.]

The effect of submerging the soil under 5, 10, 15 and 20 cm. of water on the survival of *Echinochloa crus-galli* plants in rice fields was studied. Three varieties of *E. crus-galli*, present in the rice fields, were identified. In general, the weed failed to survive when submerged under 20 cm. water for 15-30 days or under 15 cm. water for 30 days.—W.J.B.

- 99 LUCERO, C. F. **Tests of herbicides for the control of weeds in lowland rice fields.** *Philipp. Agric.* 1953, **37**, No. 3, 99-110, illus.

In trials in the Philippines to control weeds in lowland rice, the following herbicides were used : (a) Du Pont 2,4-D amine (49.6% active ingredient), (b) Hi-Ester 2,4-D (50.2% isopropyl + 32.6% propylene glycol butyl ether esters), and (c) Fernoxone (80% 2,4-D Na salt). No treatment which included spraying with up to 1% concentrations of the 3 herbicides was effective for controlling *Echinochloa crus-galli*. Applications of 0.08% concentrations of 2,4-D ester, or 0.1% of the amine or Na formulations, gave complete control of *Monochoria vaginalis* in the pre-flowering stage. Applications of 0.08 and 0.1% concentrations of 2,4-D amine gave complete control of *Eichhornia azurea* in the pre-flowering stage. *Lippia nodiflora* was controlled by all herbicides at concentrations of 0.08%. *Alternanthera ficoidea* was controlled

by all herbicides at concentrations of 0.1%. Of other minor broad-leaved weeds present, *Ipomoea reptans* was killed by one treatment with 0.08% concentrations of the herbicides; *Eclipta alba* and *Sphenoclea zeylanica* required a second treatment to give complete control. Complete kill of *Cyperus iria*, *C. difformis*, *C. pilosus* and *Scirpus erectus* was obtained following applications of 0.08% concentrations of 2,4-D ester and 0.1% concentrations of 2,4-D amine and Na salt, with only slight injury to the rice. *Echinochloa colonum* could not be controlled without injury to the rice. Rice plants treated with 2,4-D concentrations ranging from 0.1 to 1% showed temporary injury in all cases, particularly where the highest concentrations were used and where the water level in the paddy fields was low. In many cases, 0.08% concentrations of 2,4-D had no visible effect on the rice. Rice seedlings at 12 days after transplanting and plants at the boot stage were highly susceptible to 2,4-D injury.—P.J.B.

- 100 KAUFMAN, P. B. **Gross morphological responses of the rice plant to 2,4-D.** *Weeds* 1953, 2, No. 4, 223-53, bibl. 61, illus. [Bot. Dep., Univ. California, Berkeley]

Greenhouse, field and plot studies were made on the development, gross morphology and anatomy of healthy rice shoots and those affected by 2,4-D, in relation to factors affecting the occurrence and magnitude of 2,4-D injury and those practices which mitigated or prevented such injury. Studies of morphological responses to 2,4-D showed that they were heterogeneous and that rice could be highly susceptible to 2,4-D damage. 2,4-D damage was greatest at temperatures over 94°F. and in young plants. In studies on the effect of 200 lb. ammonium sulphate per ac. treatments, combined with 2,4-D treatments, it was evident that N markedly increased the shoot growth of plants where it was applied after the 2,4-D; the growth aberrations caused by 2,4-D were also slightly increased. The temperature and growth stage of the plants were much more important than N treatments in affecting responses to 2,4-D. Injury from 2,4-D appeared to be greatest where rice stands were thinnest. Plants treated up to 4 weeks after germination were often completely killed by 2,4-D applied when temperatures were high. Injury in both greenhouse, field and plot tests at high temperatures occurred at the pre-tillering, boot and panicle-emergence growth stages. Plants treated during the tillering to boot stages showed little or no injury. In trials with 8 varieties, there appeared to be no marked varietal differences in response to 2,4-D. In greenhouse tests, at 97°F. plants were more susceptible to 2,4-D placed in the water in which they grew, than when the 2,4-D was applied to the foliage. In the field, there were no obvious differences in the response to 2,4-D of rice

growing in water ranging from 3 to 24 in. in depth at the time of treatment. 2,4-D was consistently more toxic to rice than MCPA, which, in turn, was more toxic than 2,4,5-T. In the field, 2,4-D and MCPA were similar in effectiveness for controlling aquatic weeds, and superior to 2,4,5-T.—P.J.B.

- 101 TOGLIANI, F. **La lotta anticrittogamica contro la fusariosi pedale del riso. [The fungicidal control of foot-rot disease of rice.]** *Riso* 1954, 3, No. 7, 17-19.

Trials carried out in Italy in 1953 showed that the best treatments of rice seed for controlling foot-rot (*Fusarium moniliforme*) are: (1) soaking germinating seed in a solution of 1% formalin (1 l. of formalin per 100 l. of water), or (2) dusting the seed before sowing with Agrosan GN at the rate of 200-250 g. per 100 kg. of seed.—E.B.O.

- 102 ISRAEL, P. and VEDAMOORTHY, G. **New experiences with Folidol-E 605 in the control of rice stem-borers.** *Curr. Sci.* 1954, 23, No. 7, 211-12, bibl. 3. [Cent. Rice Res. Inst., Cuttack, India]

A preliminary account is given of experiments to test the effect of the insecticide Folidol-E 605 on rice stem-borers using the following methods of application: (a) seeds soaked in 0.1% Folidol-E 605 for 24 hr., (b) soaking as in (a) followed by irrigating the seed-bed (50.3 sq. in.) and the transplanted crop (1296 sq. in.) with 150 c.c. and 3000 c.c. of 0.1% Folidol-E 605, respectively, at weekly intervals up to flowering, (c) soaking as in (a) followed by spraying the seed-bed and the transplanted crop with 0.08% Folidol-E 605 at weekly intervals up to flowering. Only (b) gave satisfactory control of stem-borers. Folidol-E 605 is an organo-phosphorus compound toxic to man. The effects of the insecticide on the straw and grain are being investigated.—W.J.B.

- 103 CHANDRARATNA, M. F. **Photoperiod response in rice (*Oryza sativa* L.). 1. Effects on inflorescence initiation and emergence.** *New Phytol.* 1954, 53, No. 3, 397-405, bibl. 4, illus. [Dep. Agric., Ceylon]

Curves relating the inflorescence emergence to the photoperiod have been constructed for 8 rice pure lines from Burma, Ceylon, Indonesia and India. Estimates of photoperiod sensitivity, minimum heading duration and the optimum photoperiod have been derived from parameters of second-degree polynomials fitted to these curves. The pure lines varied widely in sensitivity. Variation in the minimum heading duration and the optimum photoperiod was less marked. In the instance of one pure line, viz. Kohumawi B-11, the gross photoperiod response has been resolved into component effects. Apart from the striking influence

on the initiation of inflorescence primordia, the photoperiod exercises a small but significant effect on their further development.—Author's summary.

- 104 MISRA, G. **Photoperiodism in rice. 1. Photoperiodic response of one variety of Dalua (spring) rice.** *Bull. Torrey Bot. Cl.* 1954, **81**, No. 4, 323-8, bibl. 11. [Ravenshaw Coll., Cuttack, India]

One- or two-week-old seedlings of late-sown Dalua spring paddy rice, commonly grown in Orissa, were subjected to 8 and 10 hr. photoperiods up to ear emergence and to 24 hr. photoperiods for 20 or 30 days. Controls were grown in normal photoperiods following sowing on 19 February and transplanting on 18 March. The 8 and 10 hr. photoperiods resulted in flowering within 3 months. Control plants and those under 24 hr. photoperiods took 7 months to flower. The plants under short photoperiods gave poor grain yields with low numbers of grains and spikelets per ear, compared with the controls and those under 24 hr. photoperiods. The cause of low numbers of grains and spikelets per ear and low percentages of grains set per ear was considered to be due to high temperatures and low relative humidities during May and June.—P.J.B.

- 105 MISRA, G. **Photoperiodic response in early varieties of rice.** *Curr. Sci.* 1954, **23**, No. 7, 233-4, bibl. 8, illus. [Dep. Bot., Ravenshaw Coll., Cuttack, India]

The photoperiodic response of two early rice varieties T.N. 32 and T.A. 64 to 10-hr. short days applied to seedlings 10, 20, 30, 40 and 50 days old, was determined. Short-day treatment brought about a delay in emergence of the first panicle in both varieties and the delay was progressively greater as the treatment was applied to the plants at increasingly earlier stages.—W.J.B.

- 106 MISRO, B. and SASTRI, S. V. **Peculiar physiological behaviour in rice (*Oryza sativa*).** *Science* 1954, **12**, No. 3111, 277-8, bibl. 2. [Cent. Rice Res. Inst., Cuttack, Orissa, India]

A note is given on the time taken to flower of rice plants grown in pots with a face diameter and height of 6, 9, or 12 in., with 1, 2 or 3 plants per pot. The time taken from transplanting to flowering was increased by reducing the size of the pots from 12 to 6 in. and was reduced by increasing the number of plants per pot from 1 to 3. The difference in time taken to flower in plants grown in 12 in. pots, with one plant per pot, and that taken by plants grown in 6 in. pots with 3 plants per pot, ranged from 23 to 27 days.—P.J.B.

- 107 BORASIO, L. and CETINI, G. **Il carbonio radioattivo assorbito attraverso l'apparato**

radicale in alcune graminacee. [**Radioactive carbon absorbed through the root system in some cereals.**] *Riso* 1954, **3**, No. 9, 6-9, bibl. 1, illus. [Sta. Sper. Riscolt., Vercelli, Italy]

Results from trials with rice and wheat employing radioactive carbon confirmed that these plants absorb carbon through their roots. [See *Fld Crop Abstr.* 7: 838].—E.B.O.

- 108 KIDO, M. and others. **On the mechanism of decrease of rice yield in ill-drained paddy field.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1954, **22**, No. 3-4, 51-2, English summary p. 52. [Hokuriku Agric. Exp. Sta.]

The growth of rice plants on well- and ill-drained soils was studied. No differences in growth were observed during the early development of the plants, which took place in cool weather, but with increasing temperatures the superior development of plants on well-drained soils became increasingly marked. At harvest, the plants on well-drained soil had a greater culm length, greater number of panicles and yielded more grain than those on ill-drained soil. With increasing soil temperatures in summer the amount of root decay in rice plants on ill-drained soil exceeded that on the well-drained soil to an increasing degree.—W.J.B.

- 109 OZAKI, K. and MORIYAMA, M. **Studies on the amino acids and amides metabolism of rice plant. Part 2.** *J. Sci. Soil, Tokyo* 1952, **23**, 9. [Abstract] *Rec. Res. Fac. Agric. Univ. Tokyo (1952-3)* 1954, No. 3, p. 7.

- 110 OZAKI, K. and MORIYAMA, M. **Increase of protein contents in white rice by the nitrogen application at shooting.** *J. Sci. Soil, Tokyo* 1953, **23**, 146, [Abstract] *Rec. Res. Fac. Agric. Univ. Tokyo (1952-3)* 1954, No. 3, p. 7.

The quantity of protein in rice grain was increased by more than 10% by N application at shooting time. The main protein increase was in oryzanine and there was a slight increase in bran N. There was no significant increase in protein quality.—W.J.B.

- 111† DE, P. K. and DIGAR, S. **Loss of nitrogen gas from water-logged soils.** *J. agric. Sci.* 1954, **44**, No. 2, 129-32, bibl. 4, illus. [State Agric. Res. Inst., W. Bengal, India]

The investigation shows that when water-logged soils were treated with nitrogenous manures and fertilizers such as oil cake, water hyacinth, ammonium sulphate and sodium nitrate, a large volume of nitrogen was evolved as gas. This loss began 7-12 days after application of different treatments and was quicker from inorganic fertilizers than from organic manures. Besides loss as

gas, a large amount of nitrogen was also lost in the drainage. The results suggest that if fertilizers like ammonium sulphate and sodium nitrate are applied to rice-fields by top dressing during the active vegetative growth of the crop, the loss of nitrogen as gas will probably be greatly minimized.—Authors' summary.

112 HAYNES, D. W. N. **The calculation of costs of mechanical operations with particular reference to the mechanized harvesting of rice.** *Malay. agric. J.* 1954, **37**, No. 2, 54-67, bibl. 4, illus.

113 COMISSÃO REGULADORA DO COMERCIO DE ARROZ. Documentação sobre o arroz—Lista mundial, preliminar, de organismos e periódicos. [**Documentation on rice. Preliminary world list of organizations and journals.**] 1954, pp. 28. [Lisbon]

Organizations and journals dealing with rice cultivation and marketing are listed.—W.J.B.

GENERAL

114 HEUSER, W. Untersuchungen über die Höhe und Struktur des Ertrages beim Wintergetreide unter dem Einfluss verschiedener Drillweiten. Zugleich ein Beitrag zur Frage der Wenig- und Weitraumformen. [**An examination of the effect of distance between drills on the level and nature of the yield of winter cereals, being, at the same time, a contribution to the question of small- and large-spaced types.**] *Z. Acker- u. Pflbau* 1954, **98**, No. 1, 25-52, bibl. 16. [Bayreuth, Bavaria, Germany]

Three winter cereals, rye, barley and wheat, were sown at constant rates, (120, 130 and 180 kg./ha., respectively), each species being sown at 3 drill-spacings namely, 10, 15 and 20 cm. Of the two varieties of rye, Carsten's reacted favourably to the narrow drill-spacing while Petkuser was indifferent, except in dry years or on a sandy soil. In winter barley, the 2-rowed variety attained higher yields with a narrow spacing of drills while the 4-rowed variety did not react to drill spacing. In both barley and rye, it was the fine-stemmed variety which reacted favourably to narrow drill-spacing. In the five winter-wheat varieties, narrow spacing favoured high yields, especially in dry years. In wheat, the yield increase was attributed to a denser stand, rather than to an increase in the yield per ear, or, in the case of straw yield, to an increased weight per stem. It is thought that the importance of the effect of width of drill on yield has been underestimated. In dry areas, narrow drilling offers the best insurance against loss of yield by drought.—D.B.

115† MADERO, G. E. El pastoreo de los cereales. [**Grazing cereals.**] *An. Soc. Rur. Argent.* 1953, **87**, No. 11, 17-20 and 30, bibl. 8. The practice of grazing cereals in winter in Argentina is described. The varieties of wheat, barley, oats, rye and maize suitable for grazing are listed.—W.J.B.

116 WASSENAAR, R. Vorstschade aan de rassen van landbouwgewassen in de winter van 1953-4. [**Frost damage to crop varieties in the winter 1953-4.**] *LandbVoorl.* 1954, **11**, No. 9, 413-23, illus. [Rijksinst. Rassenonderz. Landbgewassen, Wageningen]

In the course of normal interprovincial variety trials in the Netherlands in 1953-4, the percentage area under each crop variety which survived the exceptionally hard winter 1953-4 was calculated. Data for winter wheat, winter rye, winter barley, winter oilseed-rape, and herbage crops are presented. Among winter-wheat varieties, for the whole of the Netherlands excluding inundated areas, the percentage survival (percentage of the sown area on which the crop survived) of Heine's 7 was 92%. Heine's 7 occupied 50% of the total area sown with winter wheat in 1953. The percentage survival of Elizabeth and Carsten's 5, Staring, Mado, Minister and Nord Desprez, respectively, was 99, 92, 19, 21, 13 and 5%. Heine's 7 occupied 83% of the area sown with winter wheat on which crops survived. None of the 4 winter-rye varieties tested suffered from frost damage. Among varieties of winter barley, Urania, which occupied 88% of the total sown area, showed little resistance to severe frost. The average percentage survival of Urania for the whole of the Netherlands was 9%. The percentage survival of Vinesco, Mansholt's 2 and Vindicat, respectively, was 30, 25 and 18%. The percentage survival of the 2 most commonly sown varieties of winter oilseed-rape, Lembke's and Mansholt's Hamburger, was 80 and 48%, respectively; early-sown plots suffered more than late-sown ones.—W.J.B.

117 ANISKIN, G. A. [**Uncropped soils and wastelands of Siberia—a great reserve for increasing grain production.**] [Russian] *Zemledelie (Agriculture)* 1954, No. 4, 3-9.

118 THOMPSON, E. G. **Crop planning: cereal varieties. Spring sorts in the autumn.** *Fmr and Stk-Breed.* 1954, **68**, No. 3385, 71 and 73, illus.

The pros and cons of sowing, in Britain, winter varieties of cereals in the spring, and spring varieties in the winter, are given.—C.L.S.

119 KOJIĆ, M. Ispitivanje zakorovljenosti nekih žita u okolini Beograda. [**Investigations of weediness of some cereals in the vicinity of**

Belgrade.] *Arhiv. polj. nauke* (Trans. Inst. agron. Res. Belgrade) 1953, **6**, No. 13/14, 35-48, bibl. 8, English summary pp. 47-8. [Received July, 1954]

The cereals concerned are wheat, barley and maize.—M.H.

- 120 CASS SMITH, W. P. **Cereal smut diseases and their control.** *J. Dep. Agric. W. Aust.* 1954, **3**, No. 3, 329-38, illus.

- 121 MAY, A. W. S. and PASSLOW, T. **Insecticidal control of *Agrotis infusa* (Boisd.) and *Leucania unipuncta* (Haw.) in field crops.** *Qd J. agric. Sci.* 1954, **11**, No. 1, 1-14, bibl. 10, illus.

In field trials on the Darling Downs on the control of cutworms and armyworms, it was found that 0.5 lb. DDT reduced larval populations greatly and that resulting crop yields were as high as those from crops treated with heavier doses. The crops used in the trials were wheat, barley, oats and lucerne.—M.P.

- 122 DISNEY, R. W. **The specific heat of some cereal grains.** *Cereal Chem.* 1954, **31**, No. 3, 229-39, bibl. 9. [D.S.I.R. Pest Infest. Lab., Bucks, England]

The specific heat of wheat grain, as determined with a modified Bunsen ice calorimeter, ranged from 0.582 cal/g/°C. at 33.6% moisture content to 0.302 cal/g/°C. at 1.4% moisture content. Observations were made on the hysteresis effects between wetted and dried wheat. A summary is given of data on the specific heat of wheat at different moisture contents, taken from the findings made by previous workers, for comparison with the findings reported in this paper. Comparisons of the specific heat of Bersée wheat, barley and paddy (unhulled rice) at different moisture contents showed that there was little difference between the values obtained for these three grains.—P.J.B.

- 123 DERENNE, P. Application du test du chlorure de 2,3,5-triphenyltetrazolium aux plantules de céréales endommagées par le froid. [Application of the 2,3,5-triphenyltetrazolium chloride test to seedlings of cereals injured by frost.] *Bull. Inst. agron. Gembl.* 1954, **22**, No. 1-2, 155-6, bibl. 2. [Sta. Amélior. Pl. Grande Cult., Gembloux, Belgium]

This reagent, previously used to test viability of seeds and pollen grains, was used, during the exceptionally cold winter of 1953-4, to estimate the proportion of plants of winter wheat and winter barley which had been damaged by frost. The procedure was to remove roots, leaves, and leaf sheaths from tillers until there remained only the

apical cone consisting of growing point and leaf bases. The cones were cut longitudinally and immersed for several hours in a 1% solution of 2,3,5-triphenyltetrazolium chloride. The seedlings reacted as follows: (a) those which were obviously alive were uniformly coloured deep red; (b) those which were destroyed by frost showed no trace of colour; (c) frost-injured seedlings were red in the central zone while their peripheral zones were uncoloured. It is thought that by testing a sufficient number of plants at the onset of a thaw, it should be possible to make a forecast of the future density of the stand.—D.B.

- 124 BALÁZS, F. [Investigations on root development in cereals.] [Russian] *Acta agron. hung.* 1954, **4**, No. 1-2, 69-103, bibl. 34, illus., German and English summaries pp. 100-3.

- 125 ENGLAND AND WALES. Ministry of Agriculture and Fisheries. **Mites in stored grain and feedingstuffs.** 1954, pp. 4. [Leaflet exhibited at Royal Show, Windsor]

Information is given on mites and their control. Mites, the most common of which in stores is the flour mite (*Tyroglyphus farinae*), multiply quickly under warm, moist conditions. The control measures described consist of hygienic measures and the use of insecticides (dusts, sprays and smokes). The best insecticide is Lindane.—E.B.O.

LEGUMES

COWPEAS

- 126 HOOVER, M. W. and DENNISON, R. A. **The correlation of stages of maturity with certain physical measurements in the southern pea, *Vigna sinensis*.** *Proc. Amer. Soc. hort. Sci.* 1953, **62**, 391-6. [Florida Agric. Exp. Sta., Gainesville]

Studies are reported on the effect of different stages of maturity on the moisture content of the seed, the shelling percentage, the specific gravity of blanched and unblanched seed, and the refractive index and specific conductivity of the extracted juice of seed of *V. sinensis*. The variety California Blackeye No. 5. was used. The stages of maturity ranged from when the seed could be separated from the pericarp, onwards, at 6 two-day intervals. The moisture content of the seed decreased from 83.9 to 50.2% and the percentage of seed in the total weight of seed + shell increased from 25.6 to 75.7% as the seed increased in maturity from the first to the sixth sampling date.

—P.J.B.

SOYABEANS

- 127 HARTWIG, E. E. **Lee—a superior soybean for the midsouth.** *Soybean Dig.* 1954, **14**, No. 8, 14-15, illus. [Fld Crops Br., U.S. Dep. Agric.]

Lee is adapted to south-east Virginia, east N. Carolina, north S. Carolina, north Georgia, Alabama, Mississippi, south-east Arkansas and north Louisiana, where it is expected largely to replace Ogden. In regional tests in the south-eastern States, Lee and Ogden have given average seed yields of 29.3 and 27.5 bu. per ac., with oil contents of 21.5 and 21.3%, respectively. Lee is resistant to seed shattering and to a number of diseases. Compared with Ogden, it is 5 days later in maturing, 21 days later than Dorman and 10-12 days later than Roanoke and Jackson.—P.J.B.

- 128 EVANS, H. J. **Diphosphopyridine nucleotide-nitrate reductase from soybean nodules.** *Pl. Physiol.* 1954, **29**, No. 3, 298-30, bibl. 10. [N. Carolina State Coll., Raleigh]

- 129 BÜNNING, E. Der Verlauf der endogenen Tagesrhythmik bei photoperiodischen Störlicht-Versuchen mit Soja. [The course of the endogenous daily rhythm in photoperiodic interrupted-light trials with soyabeans.] *Physiol. Plant.* 1954, **7**, No. 3, 538-47. bibl. 6. [Bot. Inst., Univ. Tübingen]

[See also *Herb. Abstr.* 19 : 574.]

GROUNDNUTS

- 130 PREVOT, P. and OLLAGNIER, M. Influence des conditions de culture sur la qualité des semences d'arachide. [Influence of cultivation conditions on the quality of groundnut seed.] *Oléagineux* 1954, **9**, No. 10, 703-7, bibl. 3, illus. [Inst. Rech. Huiles et Oléagineux]

In the Niari Valley, Middle Congo, French Equatorial Africa, groundnut yields from mechanized cultivation on fertile soils are, on an average, 2 metric tons per ha. in the first season (October-February), and 1 ton in the second season (March-June). These high yields are obtained with spacings of 40×15 cm. corresponding to a density of 167,000 plants per ha. A trial was carried out to study the influence of spacing on growth of groundnut plants, and on yield and quality of the seed produced. Results showed that at the spacing of 40×15 cm. which was compared with that at 40×80 cm., the growth stages were unchanged but there was etiolation of the stems and a decrease in leaf surface and photosynthetic activity, which was related to a decrease in Mg in the leaves.

The percentages of N and P did not change considerably. The seed produced from plants spaced at 40×15 cm., and then sown at the same spacing, gave plants which yielded on an average 27% more per plant than those grown at the spacing of 40×15 cm. but obtained from seed produced at the spacing of 40×80 cm. When the plants were grown at the spacing of 40×80 cm., there was a difference in yield per plant in favour of the plants from seed produced at 40×15 cm., but these differences were not significant. As the seed produced at the spacing of 40×15 cm. is formed mostly at the base of the plants, it is thought that this seed is of a better quality than that which forms later in higher branches of plants grown at wider spacings.—E.B.O.

- 131 MORWOOD, R. B. **Peanut pre-emergence and crown rot investigations.** *Qd J. agric. Sci.* 1953, **10**, No. 4, 222-36, bibl. 10, illus.

Pre-emergence rot caused by *Rhizopus arrhizus* and crown rot caused by *Aspergillus niger* have reached serious proportions in Queensland. Effective measures of control which result in high percentage germinations are the treatment of seeds with organic mercurial dusts, containing at least 1.5% Hg., at the rate of 5 oz. per 100 lb. kernels, and a suitable crop rotation to maintain a high humus content in the soil.—M.P.

- 132 HEMINGWAY, J. S. **Cercospora leafspots of groundnuts in Tanganyika.** *E. Afr. agric. J.* 1954, **19**, No. 4, 263-71, bibl. 6.

Details are given of the diseases caused by *Cercospora personata* and *C. arachidicola* which have reached epidemic proportions in the Central, Western and Southern Provinces of Tanganyika. The control measures recommended are crop rotation, burning or burial of plant residues, and discing of all volunteer plants. Fungicidal dusts and sprays have proved less effective controls.—M.P.

- 133 ARANT, F. S. **Control of thrips and leafhopper on peanuts.** *J. econ. Ent.* 1954, **47**, No. 2, 257-63, bibl. 10. [Agric. Exp. Sta., Auburn, Alabama]

To control thrips (*Frankliniella fusca* and *F. tritici*) and the leafhopper (*Empoasca fabae*) on groundnuts the treatment recommended consists of an insecticidal-fungicidal dust containing either 2.5% DDT or 10% Toxaphene in a mixture with 3.4% copper and at least 65% sulphur. Treatment of runner groundnuts should begin at about the time of the last cultivation near the middle of July, and 4 applications should be made at the rate of 20 lb. per ac. at 7-10-day intervals. Treatment of Spanish groundnuts is the same as for runners, except that control should begin 2 to 3 weeks earlier.—E.B.O.

PEAS

- 134† ORTH, H. Zur Inaktivierung wuchsstoffhaltiger Herbizide durch Adsorption an Kohle. [Inactivation of hormone-containing herbicides by adsorption with carbon.] *Z. Pflkrankh.* 1954, **61**, No. 8, 385-96, bibl. 11, illus. [Biol. Bundesanst. Land- u. Forstwirtschaft.]

Laboratory, greenhouse and field tests have been carried out which have resulted in the development of a pre-sowing treatment of crop seeds with activated carbon in order to neutralize the harmful effects on them of the hormone constituent of herbicides which had been previously sprayed on the land. Seeds thus pre-treated could be sown the day following treatment of the land with a hormonal herbicide. [The experiments were made on vegetable seeds, peas, carrots and onions, but it is possible that the principle might be of more general application.]—D.B.

- 135 ENGLAND AND WALES. Ministry of Agriculture and Fisheries. **Pea and bean weevils** [*Sitona* spp.]. *Adv. Leaflet. 61. England and Wales. Minist. Agric. Fish.* 1954, pp. 3.
- 136 FRANSSEN, C. J. H. and others. Parathion residu's bij de erwenteelt. [Parathion residues in pea crops.] *LandbVoorl.* 1954, **11**, No. 7, 351-6, bibl. 5. [Inst. Plantenziekten. Onderz., Wageningen, and Rijks Inst. Volksgezondheid, Utrecht]

Trials were carried out in 1951 and 1952 to determine what interval should elapse between the date of application of Parathion to peas (for the control of pea moth) and the harvesting of the crop, in order to ensure freedom of straw and peas from poisonous residues. Parathion was applied as a spray to the pea crops in 4 doses, each of 400 g. pure Parathion per ha. The interval between the last of the 4 applications and harvest was 8 days in the case of peas picked green. The ripe peas for threshing were cut 2 weeks after the final application of Parathion and remained on tripods 4 weeks before being removed from the field. The straw of these peas contained 0.3 ppm. Parathion when placed on tripods but, after 4 weeks on tripods, they contained no Parathion. No Parathion was found on the threshed peas. The Parathion content of fresh peas after removal from the pods varied from nil to 0.2 ppm.; the Parathion content of the leaves (at the time of picking) of the peas which were picked green was 0.7 ppm. The highest permissible Parathion content in food or fodder is considered to be 2 ppm. As a result of the experiments, a 10 days' interval between Parathion application and picking is considered sufficient in the case of green peas for canning or deep-freezing (in which processes pods are carefully washed and

removed) but a minimum period of 3 weeks is still considered necessary where green peas are to be sold direct to the consumer. There is no danger of Parathion poisoning from threshed field peas, which are normally harvested 3 weeks or more after the last Parathion application.—W.J.B.

- 137 CROFTS, F. C. **Superphosphate and molybdenum; responses in peas at Wollongbar.** *Agric. Gaz. N.S.W.* 1954, **65**, No. 4, 185-6, illus.

Fertilizer trials with the early-maturing Massey Gem garden peas were conducted on the red basaltic soils of the Richmond River district. Increased yields were obtained when superphosphate at 4 cwt. per ac. was applied with the seed. It was shown that superphosphate increased the percentage of plants which became effectively nodulated. Yields were still greater when sodium molybdate was also added at 8 oz. per ac. though nodulation was less. Dressings of lime up to 1 ton per ac. failed to increase yields.—M.P.

- 138 GREAT BRITAIN. Home Grown Threshed Peas Joint Committee. **Report for 1952-1953.** Peterborough, 1954, pp. 53, bibl. in text, illus.

INVESTIGATIONS REPORTED :

1. Manuring, pp. 26-30. There was little response to broadcast fertilizer treatments. Shorter straw appeared to be associated with higher yield. Nitrogen did not increase the length of pea haulms; it tended, rather, to decrease yields.
2. Varieties, pp. 30-2. Previous results were confirmed; Servo, a large blue, again outyielding other varieties.
3. Date of sowing, pp. 34-9. Sowing early in March gave optimum yields.
4. Weed control, pp. 39-44. Hoeing gave the highest yields. High-volume applications of DNBP, at 60 gal. per ac. also gave good results.
5. Pest control, pp. 44-51. 16.7% DDT at 100 oz. in 100 gal. of water per ac. (0.1%) gave the best control of the pea aphid.—M.P.

BEANS

- 139 CONNOLD, W. Q. **Winter beans in the south-west [of England].** *Agriculture, Lond.* 1954, **61**, No. 5, 217-20. [Nat. Agric. Advisory Serv., S.W. Prov.]

The results are given of farm trials in 1948-52 in which the yields of oats, beans [*Vicia faba*], and oat/bean mixtures were compared. Mixtures of oats and beans in various proportions were used. The method of assessing the value of each mixture was to compare the quantities of protein and starch produced by the mixture with those from corresponding areas of the individual crops grown

separately (viz. 2 acres of a half-and-half mixture were compared with 1 ac. of beans plus 1 ac. of oats). On an average the mixtures yielded 20% more of both protein and starch than corresponding acreages of individual crops grown separately. Ploughing in of bean seed gave better protection against birds than drilling.—W.J.B.

- 40 WAKANKAR, S. M. **Two catch crops for Madhya Bharat.** *Indian Fmg* 1954, **4**, No. 4, 28-30, illus.

As a result of a joint breeding programme, conducted by the Indian Council of Agricultural Research and the State Government, an improved variety of *Phaseolus aureus*, Krishna-2, and of *Phaseolus mungo*, Ujjain-4, are announced. Both are grown as summer crops preceding winter wheat.—W.J.B.

- 41† BAWDEN, F. C. and KASSANIS, B. **Some effects of thiouracil on virus-infected plants.** *J. gen. Microbiol.* 1954, **10**, No. 1, 160-73, bibl. 13, illus. [Rothamsted Exp. Sta., Harpenden, Herts]

An account is given of investigations into the effect of thiouracil solutions on virus multiplication in various host plants, including French bean (*Phaseolus vulgaris* var. Prince) and broad bean (*Vicia faba*), and its effect on the growth and appearance of these same plants.—E.B.O.

LENTILS

- 42† GORJUNOVA, A. [Mixed sowings of *Lens esculenta* with *Camelina* sp.] [Russian] *Zemledelie (Agriculture)* 1954, **2**, No. 7, 74-8, illus.

There is a need in USSR to extend the areas under seed legumes, and in this connexion the merits of *Lens esculenta* are discussed. The plant is grown primarily in the central black-earth belt, the southern regions of the non-chernozem belt and in the middle Volga Provinces. The hay, straw, chaff and green mass of the lentil plant are used as protein feed for cattle, horses, pigs and sheep. The straw contains 11.3% protein. In areas subject to drought, the crop is used as green feed for stock. Problems of mechanical harvesting have been largely overcome by sowing the crop mixed with *amelina* sp. which serves as a support for the lentil plant. The proportions recommended in the mixture are 3.5-4 kg. *Camelina* with 1.1-1.2 c. = 100-120 kg.) lentils per ha. when sown early in spring. Details of precautions to be taken when harvesting by combine are recorded.—M.H.

- 43 TERRE MAROCAINE. Note sur la lentille large verte d'Algérie. [Note on the large green lentil in Algeria.] *Terre maroc.* 1954, **28**, No. 295, 225-9, bibl. 1.

After information on the botany and systematics of lentil (*Lens esculenta*) varieties, a brief account is given of selection work with a large green variety at the Station Centrale de Maison-Carrée, as well as of sowing-rate trials with this variety and of comparative trials of this with other lentil varieties. It is concluded that the growing of the large green variety could be extended in Algeria.—E.B.O.

ROOTS

SUGAR-BEET

- 144 ENGLAND AND WALES. Ministry of Agriculture and Fisheries. **Sugar-beet. Sowing to singling.** *Adv. Leaflet* 122. *England and Wales. Minist. Agric. Fish.* 1954, pp. 6.

- 145 LILL, J. G. **Sugar beet culture in the North Central States.** *Fmr's Bull.* 2060. U.S. Dep. Agric. 1954, pp. 42, illus.

Comprehensive recommendations are given for the cultivation of sugar-beet and for the control of insect pests and diseases.—P.J.B.

- 146 SEMYKIN, K. I. [Square-pocket sowings of sugar-beet in Latvia.] [Russian] *Zemledelie (Agriculture)* 1954, **2**, No. 5, 53-6, illus.

- 147 THOMPSON, E. G. **Results of official sugar beet variety trials.** *Brit. Sug. Beet Rev.* 1954, **22**, No. 4, 157-9, illus.

The results of the 1953 sugar-beet variety trials at 17 centres in Gt Britain are compared with those of similar trials in 1951 and 1952. Tables indicate the average calculated yield of sugar, washed roots and tops per ac. expressed as a percentage of the mean of control varieties, the average percentage of sugar in the roots and the average percentage of bolters in the crops. The relative order of yield showed little change when compared with the 1951 and 1952 trials, Klein E (Sharpe's) giving the highest yield of sugar per ac. The conditions of the 1953 season favoured high yields and also excessive bolting of crops sown at the normal time, the lowest proportion of bolters being given by the 4 strains: Bush E, Battle's E and Klein E (Sharpe's) and Klein E (German).—M.P.

- 148 GREAT BRITAIN. National Institute of Agricultural Botany. **Strains of sugar-beet.** *Fmrs Leaflet* 4. *NIAB* 1954, pp. 4.

Brief notes are given on 13 strains of sugar-beet commonly available in Great Britain at present. The average results from the 1951-3 trials with these commercial varieties are given. All but two varieties are recommended.—M.P.

- 149 KELLER, E. R. and RAPIN, J. Résultats d'essais de variétés de betteraves à sucre 1949-1953. [**Results of trials with sugar-beet varieties 1949-53.**] *Rev. rom. Agric.* 1954, **10**, No. 7, 53-4. [Eidg. Landw. Versuchsanst., Zürich-Oerlikon (E.R.K.) and Sta. Féd. Essais Agric., Lausanne (J.R.)]

Owing to the small area (5000-6000 ha.) devoted to sugar-beet cultivation in Switzerland, improvement of this crop has been limited to trials of the best varieties from foreign countries, namely: Hungary, Poland, France, Sweden, Germany, the Netherlands and Denmark. The trials are conducted jointly by the Federal Experiment Stations, the sugar refinery of Aarberg (Berne) and the Cultivators' Association. After recapitulating the qualities of the several types of sugar-beet (E, Z, N, RC, and polyploid), the performance of the varieties under trial is tabulated as regards root yield, percentage of sugar, yield of sugar per ha., resistance to *Cercospora* and yield of tops. Kleinwanzleben E gave the best yield of sugar but was susceptible to *Cercospora*. Kleinwanzleben Polybeta is less susceptible; it also gives high yields of sugar and has a higher sugar content, but lower root yield, than Kleinwanzleben E. Kühn P is interesting because of its earliness.—D.B.

- 150 KELLER, E. R. and RAPIN, J. Sortenprüfung bei Zuckerrüben 1949-1953. [**Variety testing in sugar-beet, 1949-53.**] *Mitt. schweiz. Landw.* 1954, **2**, No. 7, 117-21. [Eidg. Versuchsanst., Zürich-Oerlikon, Liebefeld-Bern, and Lausanne, Switzerland]

This is the German version of the preceding abstract.—D.B.

- 151 LEPRI, P. Varietà italiane ed estere di barbabietola da zucchero in coltura asciutta in Umbria. [**Italian and foreign varieties of sugar-beet in dry cultivation in Umbria.**] *Industr. saccar. ital.* 1954, **47**, No. 7-8, 245-8, bibl. 2.

Results from a cultural trial in Umbria, Italy, to compare 16 sugar-beet varieties, including both Italian and foreign types, showed that the sugar content of the Italian varieties was, on an average, 18.52% for roots lifted on 21 August and 17.28% for roots lifted on 4 September. The corresponding values for the foreign varieties were 18.39 and 17.39%. Alba NP 132 gave the highest yield of sugar with 8600 kg. per ha., followed by Maribò P, 8405 kg.; Desprez TM, 8250 kg.; Klein E, 8210 kg.; Mezzano N, 8200 kg.; Klein polybeta, 8170 kg.; and Mezzano P, 8110 kg.—E.B.O.

- 152 HULL, R. Control of yellows in sugar-beet seed crops in Great Britain. *Agriculture, Lond.* 1954, **61**, No. 5, 205-10, bibl. 2. [Rothamsted Field Sta., Dunholme, Lincoln]

The methods used since 1951 for the control of virus yellows in sugar-beet seed crops are described. Between a third and a half of all steckling beds are grown in isolated northern areas, such as Durham and Northumberland, remote from the main beet-growing areas of eastern England. The average incidence of virus yellows in root crops grown in these northern areas is low (3%) compared with 40% in the seed-growing areas of Lincolnshire. When stecklings are grown in areas where the incidence of virus yellows is high, one of the following methods of control is applied: (a) the beds are sprayed with Parathion, Schradan or Dimefox (the method is liable to fail if winged aphids colonize the stecklings before they are large enough for spraying), (b) stecklings are grown under cover-crops of barley and sprayed with an insecticide after the barley is cut. In case (b) the barley must be sufficiently dense to give the stecklings adequate cover. The incidence of the disease in the steckling beds in isolated areas, in the seed crops derived from these stecklings and in crops grown by methods (a) and (b), during the period 1950-4 are tabulated. Spraying the beds (method (a)) was successful in the first 3 years but failed in about half the beds in the fourth year, when attacks on the stecklings by winged aphids were exceptionally early. In general, the incidence of the disease in seed crops grown from stecklings from isolated areas and in those grown by method (b) was low. The certification scheme for steckling beds is described in detail. Beds showing more than 10% of plants infected with virus yellows are condemned, those showing less than 1% are certified as satisfactory and those with between 1% and 10% infection are used only if needed to make up the required area of seed crops. Seed firms now supply farmers with certified stecklings instead of seed from which to grow their own stecklings.—W.J.B.

- 153 SERBIN, S. S. [**Non-radical (foliar) nutrition of sugar-beet plants.**] [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR)* 1954, **96**, No. 1, 133-5, bibl. 4. [All-Union Sci. Res. Inst. Sugar-Beet, Kiev, Ukraine]

In 1904, attention was drawn by Severyev to the method of spraying plants with nutrients. Later the method was developed as a measure to ensure that the plant received all the mineral nutrients necessary for its full development. The author's experiments on non-radical nutrition with sugar beet were designed on a basis of (1) inadequate supply of nutrients to the root, and (2) complete absence of nutrition through the root. The plants were grown in culture vessels on sand which contained no organic residues or soluble salts. The tests comprised the following 4 variants: (a) control vessel with 16 kg. sand supplied with (in g.) 18.38 $\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$; 4.8 K_2HPO_4 ; 1.6 KCl

0 KNO₃; 4.91 NaNO₃; 8.1 MgSO₄·7 H₂O; CaCO₃; 1.2 Fe₂(SO₄)₃; 0.045 H₃BO₃; 0.24 MnSO₄·5 H₂O; 0.1 Al₂(SO₄)₃·18 H₂O; (b) vessel with sand to which was added one-tenth part of the salts given in (a); (c) same as (b) + all salts supplied in a leaf spray [quantity not stated] each day throughout the vegetative period; (d) vessels without nutrients, but after seedling emergence, the cotyledons and subsequent leaves were supplied with all the above salts by spraying. In addition, sugar-beet seed was sown on pure sand moistened with distilled water to 50% of full moisture-holding capacity. (These plants grew for 10-12 days after emergence and then withered.) Spraying was applied at first with 0.5% nutrient salts and then with 1 and 1.5%. Sowing was on 12 May and plants were taken for analysis on 3 October. The data show that spraying induced an increase in the flow of sugars from leaves to roots. If spraying is applied at the pre-harvest period when the assimilating tissue is full of sugars, the method of non-radical nutrition may serve as a means of increasing the sugar content of beet roots.—M.H.

54† SCHARRER, K. and JUNG, J. Weitere Untersuchungen über Beziehungen zwischen Nährstoffversorgung und Oxalsäurebildung im Zuckerrüben- und Mangoldblatt. [A further examination of the relationship between the supply of nutrients and the formation of oxalic acid in leaves of sugar-beet and mangel-wurzel.] *Z. Pflernähr. Dung.* 1954, **66**, No. 1, 1-18, bibl. 16. [Justus Liebig-Hochschule, Giessen]

Pot experiments were carried out to discover the causes of the formation of oxalic acid in plants and to determine whether, and to what extent, the formation of oxalic acid in leaves of sugar-beet and mangel-wurzel is influenced by N, P, K, Ca, Na and B. Though primarily a study of plant metabolism, the results are of practical value in indicating how oxalic-acid production can be controlled in plants used for human food and for animal fodder. In this connexion, the form in which N is given to the plant is important because plants receiving ammonical N produce less oxalic acid than those receiving N as nitrate. Heavy applications of calcium nitrate convert oxalic acid to the physiologically inactive calcium oxalate.—D.B.

55 ENIKEEV, S. G. [Multicapitate roots and other deviations from the normal in sugar-beet.] [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR)* 1954, **96**, No. 3, 649-51, bibl. 2, illus. [Kirgiz Agric. Inst., Frunze] See also *Fld Crop Abstr.* 7 : 519.] The author's study has revealed that multicapitate roots develop in those specimens where hidden cavities occur near the growing tip. The multicapitate nature is entirely dissociated from the genetical nature of the plant.—M.H.

156 CORNS, W. G. Improvement in low-temperature resistance of sugar-beet seedlings treated with Dalapon (2,2-dichloropropionic acid). *Science* 1954, **120**, No. 3113, 346-7, bibl. 2. [Pl. Sci. Dep., Univ. Alberta, Edmonton]

Sugar-beet seed was germinated in vermiculite moistened to capacity with water containing nil, 4, or 8 ppm. Dalapon. Over a 6-day germination period, the Dalapon solutions had no visible effect on the growth of the sugar-beet seedlings. Following germination, the seedlings were subjected to temperature of -10°C. for 5, 6 or 7 minutes. Plant survival was recorded within the first 2 minutes of removal from the low temperature to room temperatures. The frozen seedlings either collapsed almost immediately, or survived for several days. The seed germinated in Dalapon solutions produced seedlings with a highly significantly greater degree of resistance to the cold treatment than those germinated in water, alone.—P.J.B.

157 ALDROVANDI, A. La riduzione delle perdite di zucchero con l'idrazide maleica. [The reduction in sugar losses with maleic hydrazide.] *Industr. saccar ital.* 1954, **47**, No. 7-8, 249-56, bibl. 8.

A decrease in the percentage of sugar in sugar-beet crops is often found in Italy at the end of August before harvest. This decrease is thought to be caused by new growth of leaves forming, at the expense of materials stored in the roots, after the first leaves have withered because of drought and attacks by *Cercospora beticola*. Two series of trials were carried out in 1954 to study the possibility of avoiding this decrease in sugar content by treatment with maleic hydrazide; one took place at Pontelongo, Padova, a locality subject to attacks by *C. beticola*, where maleic hydrazide was tested in addition to treatment with 3% copper oxychloride for control of *C. beticola*, and another at Mezzano, Ravenna, where maleic hydrazide was used alone as attacks by *C. beticola* are slight in this region. Results from these preliminary trials confirmed that treatment with copper oxychloride was effective in controlling *C. beticola*, thus increasing sugar yields. Although treatment with maleic hydrazide had an inhibiting effect on growth, it did not prevent the decrease in sugar content and, therefore, did not influence sugar yields.—E.B.O.

158 NEGOVSKIĬ, N. A. [Stage of development and the production of high-yielding, non-bolting varieties of sugar-beet.] [Russian] *Izv. Akad. Nauk SSSR (Bull. Acad. Sci. USSR)* Biol. Ser. 1954, No. 3, 32-48, bibl. 15. [All-Union Sci. Res. Inst. Sugar-Beet, Kiev]

This review of the literature includes the following aspects of the subject: the vernalization stage in sugar-beet; the light stage of development in

sugar-beet ; localization of phasic changes in sugar-beet buds ; breeding sugar-beet in the light of the theory of phasic development.—M.H.

- 159 SHEPHERD, R. W. **The use of nitrogen for sugar-beet grown on light land.** *Emp. J. exp. Agric.* 1954, **22**, No. 86, 128-32. [Norfolk Agric. Sta., Sprowston]

Sugar-beet growers on the light soils in Norfolk applied the equivalent of 8 cwt. of nitrate of soda or 6 cwt. of sulphate of ammonia per ac. Experiments carried out from 1950-52 showed, however, that 4.5 cwt. of sulphate of ammonia per ac. produced maximum root yield increases, but variation in response to N appeared to depend on the seasonal rainfall. More than 3 cwt. of the fertilizer reduced the sugar content of the roots, especially in the dry years, whereas the noxious N content of the roots rose. The highest average yield of sugar was given by 4.5 cwt. of sulphate of ammonia per ac.—M.P.

- 160 ROSANOW, M. **Spraying Chilean nitrate as a combined nitrogen dressing and weed killer.** *Information.* 1954, No. 22, pp. 5, illus. [Chilean Nitrate Agric. Serv., Wageningen]

A preliminary report is given of work done by L. G. G. Warne and J. W. Ewan in the U.K. using Chilean nitrate as a herbicide on crops of sugar-beet, fodder-beet, table-beet, mangels, etc. Young beet plants were not damaged by Chilean nitrate spray, even at high concentrations, but many weed species were damaged or killed. *Spergula arvensis*, *Polygonum persicaria*, *Senecio vulgaris*, grass seedlings and shepherd's purse were severely damaged, or killed, as also were chickweed, corn marigold and horsetail. Plantains, thistles and silverweed (*Potentilla anserina*) were severely damaged and later suppressed by the beet. The uninjured weeds were, *Polygonum aviculare*, *Anagallis arvensis*, red dead nettle, and hemp nettle. Fat hen (*Chenopodium album*), which belongs to the same family as beet, was found to have benefited from the spray, as did the beet crop. In the experimental plots, beet yields were found to be higher from the sprayed plots. The spray solution used was 270 lb. Chilean nitrate in 100 gal. water per ac. with Lissapol N or Agral L.N. as a spreader. Least damage to the plants occurs when spraying is carried out at the 2-leaf stage.—M.P.

- 161 BOWER, C. A. and others. **Correlation of sugar beet yields with chemical properties of a saline-alkali soil.** *Soil Sci.* 1954, **77**, No. 6, 443-51, bibl. 7. [Washington Agric. Exp. Sta., Pullman]

In field trials on an area of saline-alkaline Umapine fine, sandy loam soil in Washington, lucerne was grown for 3 years on plots which received the following treatments before the lucerne was sown:

no treatment; 2 tons sulphur per ac., and gypsum at 2 and 10 tons per ac. Other plots were fallowed during the same period. At the end of 3 years, the lucerne was ploughed under and all plots were sown with sugar-beet. Both lucerne and sugar-beet yields were very variable and showed little relation to plot treatment. Studies were made of the relation between sugar-beet yields and soil properties by correlation analyses. Simple linear correlation analyses showed that sugar-beet yields were significantly correlated with the electrical conductivity, soluble-Ca percentage, exchangeable Na content, and the pH of the saturated soil. There was no significant correlation between yields and the exchangeable K content of the soil. The number of plants per plot was almost 4 times as important as the average root size in determining yields, indicating that adverse soil conditions had their greatest effect on the plants in the early growth stages by influencing plant survival. The exchangeable Na content of the soils was most closely correlated with yields and appeared to be largely due to a direct chemical effect. There was also a high degree of correlation between yields and the Schoonover gypsum requirement of the soil.—P.J.B.

- 162 ANTONELLI, C. and GIARDINI, A. La fertilizzazione dei terreni a barbabietole. 4a annata di esperienze. [The manuring of the soils under sugar-beet (in Italy). Fourth year's trials.] *Industr. saccar. ital.* 1954, **47**, No. 7-8, 241-4.

- 163 DONÀ dalle ROSE, A. and Dal MONTE CASONI, P. Sul trattamento con idrazide maleica alle barbabietole in vegetazione con particolare riguardo alla loro conservazione in cumuli. [The pre-harvest treatment of sugar-beet with maleic hydrazide with particular reference to its storage in heaps.] *Ann. Sper. agr.* 1954, **8**, No. 5, 1521-41, bibl. 15, English summary p. 1540. [Sta. Sper. Bieticolt., Rovigo, Italy]

- 164 DONÀ dalle ROSE, A. Attività sperimentale della Stazione di Bieticoltura. [Experimental work at the Station for Beet Cultivation.] *Publ. 26. Rovigo Sta. sper. Bieticolt.* 1953, pp. 63, bibl. in text, illus.

The work with sugar-beet consisted mainly of varietal trials to study productivity and resistance to *Cercospora beticola*, manuring trials, trials to test fungicides and insecticides, and trials with sugar-beet for fodder. The treatment of sugar-beet plants with maleic hydrazide and of glomerules [seed-clusters] with ultrasonic waves were investigated. A brief account is given of trials in southern Italy and the Italian islands to study the possibility of developing sugar-beet cultivation in those regions.—E.B.O.

FODDER-BEET

- 65 SCOTTISH AGRICULTURE. **Notes from Craibstone—8.** *Scot. Agric.* 1954, **34**, No. 1, 53-5.

Data are given of sowing-date trials with fodder-beet (Pajbjerg Rex X) in 1952 and 1953. In 1952, sowing dates ranged from 3 April to 1 May and yields from 3.4 to 4.3 tons dry matter per ac. In this year there was no clear correlation between sowing dates and yields. The earliest sowing date resulted in a large proportion of bolters. In 1953, sowing dates ranged from 27 April to 8 June. Yields decreased progressively from 4.9 to 2.3 tons dry matter per ac. as sowing dates were delayed, while the proportion of bolters decreased from 9% to nil.—P.J.B.

- 66 NORTHERN IRELAND. Ministry of Agriculture. **Reports from the counties. Fodder-beet variety trial.** *Mon. Rep. Minist. Agric. N. Ire.* 1954, **29**, No. 6, 178-9.

Fodder-beet variety trials were carried out at Arvinestown, using Red Øtofte X, Gul Øtofte X and Pajbjerg Rex X. The total yield of dry matter per ac. was similar for the 3 varieties. The roots of Pajbjerg Rex X had the highest dry-matter content; this variety also gave the highest yield of dry matter per ac., 3.95 tons.—M.P.

- 67 BAKER, C. J. L. and EDEN, A. **Studies on the oxalate contents of the leaves of certain varieties of *Beta vulgaris*.** *J. agric. Sci.* 1954, **44**, Pt. 4, 394-9, bibl. 4.

Leaves of mangels, sugar-mangels and fodder-sugar-beet were analysed for oxalate content at frequent intervals. The greatest concentration of total oxalates occurred during the summer months, forming up to 12% of the dry matter in mangel leaves, and 9% in fodder-sugar-beet leaves. By midwinter these values had fallen to 3%. The outer leaves were found to be richer than the inner leaves in total oxalate content; wilting appeared to alter, favourably, the insoluble/soluble oxalate ratio.—M.P.

- 68 BAKERMANS, W. A. P. **Iets over bewaren van voederbieten. [Notes on storing fodder-beet.]** *Landbouwk. Tijdschr., Wageningen* 1954, **66**, No. 8, 546-9, bibl. 1.

A short account is given of the various factors which influence the storage qualities of fodder-beet. Experiments in 1951-3 are described in which the influence of the following factors during 7 months' cold storage on the incidence of rot, sprouting and dry-matter losses in fodder-beet, was determined: (a) storage temperatures of 3.5, 5 and 7°C., (b) presence or absence of soil on the beet, (c) spraying

with water during storage, (d) ventilation of stored beet, (e) application of chemical preservatives. It is concluded from the results of the experiment that storage losses (rot and dry-matter losses) are at their minimum when beet are stored at 5-6°C. Losses were greater at 3-5°C. than at 5°C. Losses were smaller in beet sprayed with water twice a week than in beet kept dry. The percentage of rotted beet was much smaller (30%) in beet to which soil was added at the time of storing than in beet which was stored without addition of soil; in the case of the latter the percentage of rotted beet was 50%. Losses in beet exposed to mechanical ventilation in the cold store were greater than in beet not so exposed. Although chemical preservatives reduced sprouting, they did not reduce losses from rot and respiration, except in the case of Conserbeta, where chemical treatment reduced the percentage of rot in beet stored without added soil from 40% to 18%, compared with the control. In general, throughout the experiments, a relatively high degree of sprouting was associated with relatively small losses.—W.J.B.

- 169 BAKERMANS, W. A. P. and others. **Proeven over de invloed van bemesting, zaai- en oogsttijd op de houdbaarheid van voederbieten. [Experiments on the influence of type of manure and time of sowing and harvesting on the keeping quality of fodder-beet.]** *LandbVoorl.* 1954, **11**, No. 6, 277-9, illus. [Cent. Inst. Agric. Res., Wageningen]

The degree of rotting was measured in stored fodder-beet grown on soils of various degrees of acidity and receiving K and Mg at various levels. The effect of date of sowing and harvesting on the degree of rotting was studied at the same time. The level of manuring with K had no effect on the degree of rot observed. The application of fertilizer containing Mg at the rate of 100 kg. MgO per ha. gave consistently less rot than no fertilizer. Mg gave better results on soils with pH values less than 5.6 than on soils with values greater than 5.6. Beet grown on soils with pH values greater than 5.6 were much more free from rot (roughly 30% less rot) than beet grown on soils with pH values lower than 5.6. Since the pH level was positively correlated with Mg content it was not possible to determine whether acidity or Mg deficiency was the chief factor responsible for rot. It is stated, as a result of the experiment, that soil-water pH should be at least 5.9 and soil Mg content at least 0.0049% to ensure good storage quality in fodder-beet. In the same experiment, early harvesting (before 18 October) was associated with a high degree of rot in storage. In a further experiment in 1952-3, it was shown that early-sown beet (8 March) had better keeping quality than late-sown beet (23 April).—W.J.B.

TURNIPS

- 170 SCOTTISH AGRICULTURE. **Notes from Craibstone—8.** *Scot. Agric.* 1954, **34**, No. 1, 53-5.

Data are given of the yield of 4 different types of swede in 1952 and 1953, which showed that there was not a great deal of difference between them in terms of dry-matter yields, which ranged from 3.3-3.75 tons per ac. in 1952 and 2.3-2.75 tons per ac. in 1953. In 1952, White Fleshed (a medium-hardy strain) and in 1953, White Fleshed and Danestone (a soft, quick-growing strain) gave the highest yields. Brief notes are given on cultivating swedes in Scotland. In 1953, a direct yield comparison was made between different root-crop species and strains. Dry-matter yields of White Fleshed and H. Elephant swedes, Kirsche's Ideal mangel and Pajbjerg Rex X, Triumph and Red Øtøfte fodder-beet were 2.5, 2.5, 2.1, 2.6, 2.9 and 3.1 tons per ac., respectively.—P.J.B.

- 171 WAGENINGEN. Rijksinstituut voor Rassenonderzoek van Landbouwgewassen. Bericht over rassenkeuze. No. 168. Stoppelknollen, 1954. [Report on the choice of varieties. Pamphlet No. 168. Turnips, 1954.] *Suppl. 16. LandbVoorl.* 1954, **11**, No. 6, pp. 4.

In 1953, the area in the Netherlands under turnips was about 95,000 ha. The results of comparative variety trials with turnips for the 4 years 1950-3 are tabulated. The group of varieties known as "medium-length white purple tops" showed the best combination of desirable qualities. The variety Jobe gave the highest yield of dry matter per ha. and had an average dry-matter content in the root of 8.6%; the variety Halflange Blauwkop C.B. yielded only slightly less dry matter per ha. The varieties Gelria and Siloga (both highly frost-resistant) were the most suitable for late harvesting. Siloga and Gelria had an average dry-matter content in the root of 10.8 and 9.5%, respectively. All four varieties mentioned belonged to the group "medium-length white purple top."—W.J.B.

POTATOES

- 172 MATHUR, P. B. and KIRPAL SINGH, K. **Potato production in the Nilgiri Hills.** *Sci. and Cult.* 1954, **20**, No. 1, 17-18, bibl. 5. [Cent. Fd Technol. Res. Inst., Mysore]

The methods used and the difficulties encountered by potato growers in the Nilgiri Hills are described. Three crops of potatoes, the main (11,000 ac.), second (7000 ac.) and third (irrigated, 1500 ac.) are grown. Seed potatoes are planted at an average rate of 1600 lb. per ac. and normal yields are 4-6 times greater than the seed rate. Lupins are often used for green manuring. Fresh seed potatoes to replace degenerate stock are periodically imported from abroad.—W.J.B.

- 173 BOYD, D. A. and LESSELS, W. J. **The effect of seed rate on the yield of potatoes.** *J. agric. Sci.* 1954, **44**, Pt. 4, 465-76, bibl. 19, illus.

This paper presents evidence obtained from experiments reported in the literature on the relation between seed rate and yield of maincrop potatoes. The available experiments are sufficient to indicate what is the average relationship between seed rate and yield, but are insufficient to demonstrate any clear differences between different parts of the country, soil types, or even different varieties. Using this average relationship, optimum seed rates are presented for a range of prices of seed and produce. These optimal rates are compared with estimates from surveys of the actual amounts planted by growers in different parts of the country. Provided the optimum seed rate is attained, the precise combination of seed size and spacing distance appears to be of minor importance; that is, a grower should aim to plant at the optimum seed rate regardless of seed size. There is, however, an upper limit of spacing between sets which should not be exceeded however large the seed may be. The optimum rate of planting at 1952 prices of 'A' or 'H' certificate seed is estimated to be 16-17 cwt. in most of the main potato-growing areas of the country, though it may be a little higher where a grower has a market for once-grown seed. Surveys indicate, however, that the normal planting rate of certified seed is over a ton to the acre in these districts. For a grower's own once-grown seed, on the other hand, for which the cost is not more than the price received for ware, the optimum seed rate is at least one ton per acre, whilst the average weight of seed actually planted is only about 17 cwt. per acre. It is estimated that the average loss per acre due to this failure to plant at the optimum seed rate amounts to 20-25s. per acre planted with certified seed and 10-15s. per acre for once-grown seed. The survey data shows that in the main potato-growing areas the average planting distance between sets (17-18 in.) varies little from district to district, or farm to farm, and that spacing between the drills is also very constant at 27-29 in. Regional differences in the rate of planting of certified seed are mainly due to variations in the average size of set. The explanation of the conflict between experiment and practice appears to be that a grower usually maintains the same spacing between sets regardless of their size and that certified seed tends to be large; the average weight of a tuber of certified seed in 1950 was found to be almost 2.5 oz. compared with just over 2 oz. for the average once-grown set.—Authors' summary.

- 174 GOOL, E. van. Comportamiento fenológico y fecha óptima de plantación de cuatro variedades de papa, en Balcarce. [Phenological behaviour and optimum planting date of four potato varieties in the Balcarce

zone.] Meteoros 1954, **4**, No. 1-2, 54-68, bibl. 10, illus., English summary p. 54. [ESta. Agromet., Balcarce, Argentina]

The phenological behaviour of the potato varieties Huinkel, White Rose, Sebago and Katahdin, planted at intervals of 10 days from the beginning of September to 25 December, was observed in the seasons 1950-3. Failure to sprout occurred least frequently with the variety Huinkel. The superiority of Huinkel over the other varieties in this respect increased with progressively later sowings owing to the relatively long dormancy period of Huinkel, which obviates the need to remove sprouts repeatedly during storage before planting. The tubers of the succeeding crops had grown to the size of a pea 4-10 days before flowering. The average period of tuberization (the period between the initiation and the complete maturation of tubers) in the case of Huinkel was 95 days with September planting, 105 days with late November planting and 85 days with late December planting. The tuberization period (compared with Huinkel) was relatively long in the case of Sebago and relatively short in the case of Katahdin and White Rose. The various planting dates were divided into three periods: (a) September, (b) 5 October to 5 November, (c) 15 November to 25 December. In the harvests from each planting period Huinkel outyielded all other varieties. The highest yields in all years were obtained when potatoes were planted in period (b). At harvests following this planting period Huinkel yielded from 30 to 39 thousand kg. per ha. in both 1951 and 1952. Compared with (a) and (b) there was a marked decline in yields obtained from tubers planted in period (c). —W.J.B.

75 SALUNKHE, D. K. and others. The effect of various environmental factors on the suitability of potatoes for chip-making. Agron. J. 1954, **46**, No. 5, 195-9, bibl. 13. [Michigan Agric. Exp. Sta., East Lansing]

In trials in Michigan at two locations during 1950-2, potatoes were grown under different manurial and irrigation treatments and at 4 different planting dates. Data are given of the specific gravity of the tubers and the colour of chips made from them. There were significant differences in specific gravity and chip colour between the varieties used, between different planting dates, locations and years and between manured and unmanured crops. In trials at Lake City in 1950, early-planted crops produced tubers with lower content of reducing sugars and which made lighter-coloured chips than those from late-planted crops. In trials at Lake City in 1951, early planting again produced tubers with the highest specific gravity and best chip colour, though there were exceptions to this correlation between specific gravity and chip colour. In trials at East Lansing in 1951, the best chip colour was

produced by no-irrigation treatment, combined with 1000 lb. 3-12-12 (NPK) manure. The other manurial treatment used was 1000 lb. 0-0-18 per ac. The highest specific gravity was found where irrigation, but no manure, was applied. Irrigation appeared slightly to reduce specific gravity and darken chip colour on comparable plots. In limited trials on the effect of storage on chip quality, long storage appeared to increase chip quality differences between varieties, but largely eliminated differences caused by different planting dates. From the results of these studies, no method could be evolved for growing potatoes which would eliminate those objectionable for chipping purposes.—P.J.B.

176 LARGE, E. C. [Compiled by] Trials of substitutes for sulphuric acid for potato haulm killing, 1952 and 1953. Pl. Path. 1954, **3**, No. 3, 90-9, illus.

From trials carried out in England and Wales, sulphuric acid spraying was found to be the most efficient and the speediest method for killing both potato haulms and weeds. Sodium arsenite at high- and low-volumes and tar-oil fractions (TOF) at low volume proved good substitutes, though they were slower in effect. Both are of more practical use than acid since they are non-corrosive; but sodium arsenite is poisonous. Ammonium thiocyanate liquors appear to have potential value and have advantages over the other substances, but their chemical composition is variable and constituents other than ammonium thiocyanate may be of consequence. For ware crops, mechanical destruction of the haulm is satisfactory, but lifting should not be done until 2 weeks afterwards. In general, protective spraying is more important than haulm destruction in protecting tubers against blight infection.—M.P.

177 NORTHERN IRELAND. Ministry of Agriculture. Reports from the counties. Potato variety trials. Mon. Rep. Minist. Agric. N. Ire. 1954, **29**, No. 6, 177-8.

Five main-crop varieties of potatoes were compared at Lisnaskea in 1953. As in previous years, Arran Banner gave the highest total yield, but also contained the highest proportion of chats and blighted tubers. Arran Banner yielded 14 tons 3 cwt. of sound tubers per ac., and 5 tons 4 cwt. of others per ac. Ulster Supreme yielded 16 tons 13 cwt. of sound tubers per ac. and 6 cwt. of others per ac.—M.P.

178 VEENBAAS, M. A. De consumptiekwaliiteit van klei- en zandaardappelen. [The eating quality of potatoes grown on sand and clay soils.] LandbVoorl. 1954, **11**, No. 9, 430-6, bibl. 3, illus. [Cent. Inst. Agric. Res., Wageningen]

The eating quality of potatoes grown on sandy and clay soils was compared. In general, potatoes grown on clay soils were more floury and superior in colour, taste and smell to those of the same variety grown on sandy soils. It is recommended that the more floury varieties should be grown on sandy soils.—W.J.B.

- 179 NICKEL, J. L. **Results of potato seed-piece treatment tests in Kern County, California.** *Amer. Potato J.* 1954, **31**, No. 8, 245-51, bibl. 15. [Maple Leaf Fms Inc., Wasco, California]

An account is given of preliminary trials.—E.B.O.

- 180 GUPTA, J. C. S. and CHATTOPADHAYA, S. K. **Breaking of dormancy of potato tuber by thiocyanates.** *Sci. and Cult.* 1954, **19**, No. 12, 614-16, bibl. 3. [Bot. Lab., Presidency Coll., Calcutta]

Great Scot and Royal Kidney potatoes were soaked, soon after harvest, in 1 and 2% concentrations of potassium and ammonium thiocyanate for a period of 1.5 hr. The treated tubers were then washed and planted out, together with 2 sets of control tubers, 1 set soaked in water for 1.2 hr., and 1 set untreated. The percentage of sprouted tubers 14, 28, 46, 56 and 70 days after treatment and the percentage of rotted tubers in the planted potatoes were observed. The experiment was repeated with halved potatoes. In the case of Great Scot (whole tubers) the sprouting percentages 28 days after the date of treatment for the 1% ammonium thiocyanate treatment, the 1% potassium thiocyanate treatment, and the controls (both controls gave the same results) were 87.5, 100 and 37.5%, respectively. Comparative figures for Royal Kidney were 87.5, 62.5 and 30%. Thus thiocyanates had a marked dormancy-breaking effect on Great Scot but a less marked effect on Royal Kidney. There was a marked incidence of rotted potatoes in the treated potatoes (generally in the region of 12-25%) but no rot in untreated ones. Sprouting was not hastened by cutting the tubers before treatment.—W.J.B.

- 181 FISCHNICH, O. **Exertion of influence on the sprouting of potatoes, and the practical value of such procedure for breeder and grower.** *Landbouwk. Tijdschr., Wageningen* 1954, **66**, No. 8, 566-78, bibl. 36, illus. [Forschungsanstalt Landwirtschaft., Braunschweig, Germany]

Recent research on the storage of seed potatoes in Germany is reviewed. Special attention is paid to : the effect of storage temperatures and various chemical treatments on subsequent yields ; controlled sprouting ; interruption of dormancy in potatoes by chemical means. In one experiment, seed potatoes of all German varieties were stored in

boxes at temperatures varying from 1 to 18°C. and also under conditions of fluctuating temperature. The relative humidity of the atmosphere in the boxes was 80-92%. For 3 years in succession, the seed tubers of the variety Vera after storage at 4°C., and of the variety Bona after storage at 7°C., showed a significant increase in yield as compared with seed stored at either lower or higher temperatures. German varieties were divided into classes (1), (2) and (3) according to their response to storage temperature. Class (1) yielded best when stored at 4°C., class (2) when stored at 7°C. Class (3) was relatively insensitive to the temperatures tested. There were also differences in yield and in grade of potatoes derived from seed potatoes which had been subjected to the following treatments : (a) planted with sprouts, (b) desprouted, (c) desprouted but allowed to form new sprouts before planting. Adequate inhibition of sprouting in stored seed potatoes was obtained by the use of 100-150 g. Belvitan-K per 100 kg. potatoes in November-December. Temperatures were lower in treated clamps than in untreated ones. Untreated tubers formed sprouts 15-30 cm. long while those treated with Belvitan-K produced incipient ones only. Tubers treated with Belvitan-K usually gave higher yields than untreated ones, but the differences were not significant. Sprouting was also inhibited by means of red light. Dormancy in potatoes was broken by the use of Rindite (7 parts ethylene chlorhydrin, 3 parts ethylene dichloride and 1 part carbon tetrachloride). The rapid growth of buds from tubers treated with Rindite makes it possible to test the seed potatoes for diseases before the time when they are normally planted. Treatment with Rindite was also used to bring about rapid bud development, thus facilitating the identification of varieties by bud characteristics. The production, for plant breeding purposes, of several generations of potatoes in a year, using Rindite, is also described.—W.J.B.

- 182 LARGE, E. C. and others. **Spraying trials in the potato-growing area around the Wash, 1948-53.** 1954, *Pl. Path.* **3**, No. 2, 40-8, bibl. 3, illus.

Outbreaks of potato blight (*Phytophthora infestans*) occur earlier and spread more rapidly in this area than elsewhere in eastern England. Throughout the trials the blight-susceptible variety King Edward was used, and, in the last 3 years, Majestic also. Four treatments were compared, wet spraying, atomizing, dry-dusting and top-spraying (the last only in 1954). In all cases a copper fungicide was applied. Dry dusting was always less effective than wet spraying in retarding the progress of the blight. Results showed that spraying produced a gain in yield of up to 3 tons per ac. when the 75% stage of the attack occurred in mid-August, the gain being less when this stage was reached later. The

ain was less for the Majestic than the King Edward variety, since, in the former, the 75% stage was reached later. In all years and for all treatments, there was a loss of about 13% of the potential yield from rows damaged by the wheels of the machinery. It has been estimated that in this area, 3 years in 10 are blight-free. One protective spray should be applied early in July, and a second application only when the first signs of the blight are detected.—M.P.

- 83 KELLER, E. R. *Phytophthora*-Knollenfäule oder Braunfäule der Kartoffeln. [*Phytophthora-tuber-rot or brown rot of potatoes.*] Mitt. schweiz. Landw. 1954, **2**, No. 9, 154-6, illus. [Landw. Versuchsanst., Zürich-Oerlikon]

The potato variety Roberta is fairly resistant to *Phytophthora infestans*; Sabina, Ideal and the early yellows are less so. Arran Banner, Bintje and Askia are very susceptible. Dinitro-cresol preparations can be used to destroy diseased leaves 2 weeks before harvesting. Storage at 3-6° C. in dry conditions is recommended.—M.P.

- 84 RUSSELL, T. A. **Potato blight in West Africa.** *Emp. J. exp. Agric.* 1954, **22**, No. 85, 19-22, bibl. 8. [Dep Agric. Nigeria]

In 1952, the potato crop in the Bamenda highlands of the Cameroons was heavily attacked by blight (*Phytophthora infestans*). Control by fungicides cannot easily be carried out in the Cameroons, and trials are therefore being made to find blight-resistant varieties. Results of trials in 1953 with resistant varieties supplied by experiment stations in Scotland, Canada, and the United States are tabulated. Most of these varieties retained their resistance under the changed conditions.—D.B.

- 85 WHITE, N. H. **Decoy crops. The use of decoy crops in the eradication of certain soil-borne plant diseases.** *Aust. J. Sci.* 1954, **17**, No. 1, 18-19, bibl. 19.

The weed *Datura stramonium* was found to be of value as a decoy crop for *Spongospora subterranea* which causes powdery scab of potato. Experimental plots were thickly planted with *D. stramonium* and the controls left fallow. When the plants began to flower they were dug in as green manure. The following year potatoes were planted. On harvesting, 37% of the tubers from control plots were infected and had a mean disease rating of 4, whereas 7% only of the tubers from the *Datura* plots were infected and showed a mean disease rating of 1. Results indicate that more than one year's treatment with a decoy is needed to eradicate the disease; nevertheless, after 1 year, there had been a reduction of 79% in disease incidence.—C.P.

- 186 OCHOA, C. **Northern Peru, a possible new source of potatoes resistant to *Phytophthora infestans*.** [Abstract] *Phytopathology* 1954, **44**, No. 9, 500.

Over 400 samples of cultivated, wild and weed potatoes were obtained from a previously unexplored region of northern Peru and are now maintained at the Experiment Station at Huanayo, Peru. In tests of resistance to races 0; 1; 4; 1,4; and 2,4 of *Phytophthora infestans*, *Solanum chiquidenum* Ochoa, sp. nov. and *S. piurac* from northern Peru were immune.—P.J.B.

- 187 MÜNSTER, J. La valeur de la plantation tardive des pommes de terre pour la production du plant. [**The value of late planting of potatoes for yield.**] *Rev. rom. Agric.* 1954, **10**, No. 10, 79-81, bibl. 6, illus. [Stat. féd. d'essais agric., Lausanne, Switzerland]

Trials were conducted to investigate the effect of the date of planting of potatoes on the severity of virus disease. Late planting (end July) was not a sure means of avoiding attack by virus, but better results were obtained at higher (850 m.) than at lower (450 m.) altitudes. Later planting (mid-August onwards), while possibly avoiding attack by virus disease, might result in reduced harvests caused by mildew and early frosts. A more successful means of controlling virus disease was to remove prematurely the tops of plants which had been planted early, say in April or May.—D.B.

- 188 HOUGHLAND, G. V. C. **Unilateral effects caused by varied nutrition of potato roots.** *Amer. Potato J.* 1954, **31**, No. 8, 242-4, bibl. 1, illus. [Bur. Pl. Industr., U.S. Dep. Agric., Beltsville, Md]

The roots of potato plants 7-10 cm. high were divided so that one half was in a nutrient solution lacking only K and the other half in a solution containing only potassium chloride. In the solution lacking K, root growth was relatively good (whereas in the other solutions it was very poor) and the top part of the plants developed distinct unilateral symptoms of K deficiency. These results suggest the existence of direct channels between the roots and leaves of the potato plant. Apparently there was little, if any, cross transfer of K in the plant. Other plants grown in a similar 2-solution experiment where some of the roots were in a solution lacking only N, showed no signs of unilateral N-deficiency symptoms in the tops, but there was an unilateral production of tuber stolons, the initiation of which was markedly retarded on the side to which nitrate N alone was supplied. When K was omitted, either the number of tuber stolons was reduced or their development was retarded.—E.B.O.

- 189 FABIANI, L. **Tuberificazioni anomale della**

patata. [**Abnormal tubers in the potato.**] *Humus* 1954, 10, No. 7-8, 17-19, illus.

Two types of abnormal tubers in potato crops grown in Italy are described. The first, consisting of 2-5 tubers partly joined together, was observed in the varieties Majestic, Tonda di Berlino and Frühperle. The second, consisting of a chain of small tubers growing at the expense of a normal tuber, was observed mainly in the variety Arran Victory.—E.B.O.

- 190 ROSENQUIST, C. E. **Root fasciation in the Irish potato (*Solanum tuberosum*).** *Amer. Potato J.* 1954, 31, No. 5, 154-6, illus. [Nebraska Univ., Lincoln]

The root systems of 175 plants of the Triumph variety, 50 of Progress and 4 of Red Warba, were carefully examined to detect root fasciation. Six plants only showed root fasciations and all of these were of the double type, involving 2 roots. Of 42 plants with fasciated stems, 3 showed a single example of fasciated roots. Of the remaining 187 plants which had no stem or leaf fasciations, 3 showed fasciated roots and one of these could be traced back a generation to a fasciated parent. These observations indicate that root fasciation in potato plants may be as common as stem fasciation, and that fasciated roots are considerably more prevalent among plants having fasciated stems than among those having non-fasciated stems.—E.B.O.

- 191 HEMBERG, T. **Studies on the occurrence of free and bound auxins and of growth-inhibiting substances in the potato tuber.** *Physiol. Plant.* 1954, 7, No. 2, 312-22, bibl. 13. [Bot. Dep., Roy. Pharmaceut. Inst., Stockholm, Sweden]

Studies are reported on the amount of free and bound auxin in the flesh and the peel layer of potato tubers after different periods of storage. The acid growth-inhibiting substances which have been assumed to play a part in maintaining tubers in the resting phase were found to occur mostly in the peel layer and only in small amounts in the flesh.—P.J.B.

- 192 SATAROVA, N. A. [**Physiological peculiarities of the potato in plantings of freshly harvested tubers.**] [Russian] *Izv. Akad. Nauk SSSR (Bull. Acad. Sci. USSR)* 1954, No. 3, 62-78, bibl. 31, illus. [Timirjazev Inst. Pl. Physiol., Acad. Sci. USSR]

The physiological processes (data recorded in 12 tables) in plants from young tubers are more intense and more normal than in plants from older tubers (stored for periods of 1-4 months).—M.H.

- 193 COOKE, G. W. and others. **Placement of fertilizers for potatoes planted by machines.**

J. agric. Sci. 1954, 44, Pt. 3, 327-39, bibl. 9, illus. [Chem. Dep., Rothamsted Exp. Sta.]

Experiments already reported in *Rep. Rothamsted Exp. Sta.* 1952 and 1951 [See *Fld Crop Abstr.* 7 : 188 and 6 : 828] are described in detail and discussed. In all the experiments a hand-dropping potato planter (with fertilizer equipment) was used on unridged land. The planter is described and illustrated. Compound fertilizer at 2 different rates (7.5 and 15 cwt. per ac.) was either broadcast or placed (1) in a band in contact with the seed potatoes or (2) in a band below and to one side of the seed or (3) on the surface in front of the seed-shoe. The results were as follows. Fertilizer placed either in one band at the side and below the level of the seed, or in contact with the seed, gave consistently higher yields than broadcasting. Broadcast fertilizer gave yields similar to those given by only one-half or two-thirds as much placed fertilizer. On the average, placing fertilizer gave about 1 ton per ac. more potatoes than broadcasting. Fertilizer placed on the surface immediately in front of the seed-shoes gave yields similar to those obtained by broadcasting. Placing fertilizer in contact with the seed gave higher average yields than sideband dressings at both rates of manuring in 1951, but, in 1952, contact placement was slightly superior to sideband placement at the lower rate and slightly inferior at the higher rate. In most experiments emergence was delayed by 10-14 days when the heavier dressing (15 cwt. per ac.) was placed in contact with the seed, but the crops recovered later. There is most risk of damage from contact placement on badly prepared seed-beds, on light soils and in dry years. Dressings of 10-12 cwt. per ac. of ordinary-strength compound fertilizers are unlikely to do damage when placed in contact with the seed. If heavier dressings are to be used part can be placed in contact and part broadcast. The need for commercial equipment for placing the fertilizer at the side (preferably both sides) of seed potatoes is emphasized.—W.J.B.

- 194 ELLISON, J. H. and JACOB, W. C. **Further studies concerning the influence of irrigation on the nitrogen, phosphorus and potash requirements of six potato varieties.** *Amer. Potato J.* 1954, 31, No. 5, 141-51, bibl. 3. [Cornell Univ., Ithaca, N.Y.]

Permanent fertility plots, involving 3 levels each of N, P and K, in factorial arrangement with and without irrigation, were used to study the fertilizer requirements of 6 potato varieties. Four years' results are reported. The soil was a Sassafras fine sandy loam, rich in P and K because of many years of heavy fertilization prior to the start of the experiment. Large increases in yield were associated with N applications, but little response to P and K was noted. High N application was more effective with irrigation than without. Although certain varieties

responded best to different ratios of fertilizers, most of the varieties tested could be efficiently fertilized by regulating the rate of application of a 1-1-1 ratio. This rate should be regulated to supply the proper amount of N as it is by far the most important element involved. Green Mountain should receive 125 lb. each of N, P_2O_5 and K_2O per ac. ; Cobbler, Katahdin, Pontiac and Kennebec should receive 140 lb., and Essex 160-170 lb. This fertilizer rate should be adjusted somewhat to meet the particular soil conditions and the irrigation practice adopted on individual farms.—From authors' summary.

95 WENZL, H. Beitrag zur Prüfung von Kartoffel-Keimhemmungsmitteln. [**Contribution towards the testing of potato sprout-inhibiting substances.**] *PflSchBer.* 1954, **13**, No. 4/6, 79-83, bibl. 5, illus. [Bundesanstalt Pflanzenschutz, Wien, Austria]

Trials were made with a new type of sprout-inhibiting agent. The agent, which is unnamed, is a benzene derivative. Potatoes were treated with 0.2 and 0.15% of the agent [actual quantities not given] and stored under normal conditions between November and June at temperatures between 3-5 and 15°C. A high proportion of the potatoes developed abnormal sprouts which grew into the tuber instead of into the atmosphere and then emerged from some other part of the tuber. In many instances the ingrowing sprouts were revealed only on cutting the tuber.—D.B.

96 BROWN, W. and REAVILL, Mary J. **Effect of tetrachloronitrobenzene on the sprouting and cropping of potato tubers.** *Ann. appl. Biol.* 1954, **41**, No. 3, 435-47, bibl. 14, illus. [Imp. Coll. Sci. Technol., London]

Potato tubers dusted with a preparation containing 0.2% tetrachloronitrobenzene (TCNB) and kept in a nearly closed container in the laboratory showed reduced sprouting. The reduction was greater the lower the temperature and the earlier the application of the dust ; it was less marked with tubers lying on a moist substratum. After long exposure, and especially at higher temperatures, sprouts of treated tubers tended to show a 'witch's-broom' appearance. The repressive effect of TCNB on growth rate disappeared as soon as the tubers were brought into ordinary air. To a certain extent the action of TCNB was antagonized by treatment of the tubers with ethylene chlorhydrin. Replicated field experiments over 3 seasons, with 4 potato varieties, gave a measure of the check to bulking of the crop which is brought about by winter storage of seed tubers in presence of TCNB. This check was eliminated by airing the tubers before planting, the time necessary for this depending on conditions. An airing period of about 6 weeks, in an unheated greenhouse (apart from sun-heat), was

found to be sufficient for this purpose. The speed of emergence of the variously treated batches was closely correlated with the yields produced, especially in the earlier liftings. The average number of shoots per plant was significantly increased by the dust treatment and this was reflected in a higher seed/ware ratio in the mature or late lifted crop. There was no evidence that the delay in sprouting brought about by TCNB was due to an effect on the respiration rate of the dormant tubers. The concentration of active principle was materially diminished in treated clamps after the period (c. 5 months) of winter storage. Estimates were also made of the persistence of TCNB on exposed surfaces in still and in moving air.—Authors' summary.

197† FISCHNICH, O. and PÄTZOLD, C. Wachstums- und Entwicklungsbeeinflussung der Kartoffel durch den Hemmstoff Maleinsäurehydrazid. [**The effect of the inhibitor maleic hydrazide on growth and development of potatoes.**] *Angew. Bot.* 1954, **26**, No. 1/2, 41-52, bibl. 9, illus. [Forschungsanstalt für Landwirtschaft, Braunschweig-Völkenrode]

Experiments on the treatment of potato tops and tubers with maleic hydrazide are described. They confirm the action of this agent in preventing sprouting during storage of the tubers. They also confirm the thickening of the stalk which takes place and the development of a reticulate pattern on the skin of tubers from plants which have received an overdose (0.4%) of maleic hydrazide [actual amount not stated]. A 0.2% solution caused inhibition of sprouting without causing damage to the potato skin. Potatoes from treated plants were not poisonous when fed to pigs and rats. [See also *Fla Crop Abstr.* 7 : 1288.]—D.B.

198 DENISEN, E. L. **Response of Kennebec potatoes to maleic hydrazide.** *Proc. Amer. Soc. hort. Sci.* 1953, **62**, 411-21, bibl. 9, illus. [Iowa State Coll., Ames]

In greenhouse trials, 1000, 2000, 4000 and 8000 ppm. concentrations of maleic hydrazide (MH) were applied to the foliage of Triumph potato plants in pots. The two higher concentrations caused profuse branching in the plants and the formation of numerous small tubers. Concentrations of 375, 750, 1500, 3000 and 6000 ppm. MH were applied as foliar sprays to Kennebec potatoes grown in the field in northern Iowa. The treatments were applied on 6 July (pre-bloom stage), 20 July (full bloom stage) and 28 July (most plants had dropped their flowers). Yields of tubers from plants treated on 6 July with the above concentrations of MH in the order given were 690, 620, 390, 152 and 44 bu. per ac., respectively, compared with 718 bu. per ac. from untreated controls. Yields of tubers from plants treated on 20 July were 678, 649, 632, 477 and 242 bu. per ac., while yields of those treated

on 28 July were 687, 711, 697, 685 and 678 bu. per ac., respectively. Plants following the first and second dates of treatment showed chlorosis, leaf rolling, dwarfing and loss of apical dominance. Secondary bud formation was not inhibited. Plants treated with 3000 and 6000 ppm. concentrations of MH on 20 July and 6000 ppm. concentrations on 28 July produced aerial tubers at the nodes. Tubers at harvest showed injury where high concentrations of MH were applied, particularly at the early dates of treatment. Typical tuber injuries were growth cracks and secondary growths. Following storage, tubers from treated plants were slightly delayed in sprout production compared with controls; also, most sprouting took the form of rosette production and was not so rapid or vigorous as in the case of the controls. In a further trial, 500, 1000 and 1500 ppm. concentrations of MH, applied 5 weeks before harvest, had no effect on the plants or on yields, but caused sprouting of tubers in storage similar to that noted above. There were no differences between treated and untreated tubers in reducing-sugar content, or chip quality.—P.J.B.

- 199 LUTZ, J. M. and FINDLEN, H. **Storage behavior of field-sprouted potatoes.** *Amer. Potato J.* 1954, **31**, No. 7, 218-21, bibl. 5, illus. [Bur. Pl. Industr., U.S. Dep. Agric., N.Y.]

There was an indication that field-sprouted potatoes can be stored successfully, provided that they are cooled to 40° F. quickly after curing and that the curing period is reduced to a minimum. [Curing consists of holding potatoes at 50-60° F. for 1-2 weeks to allow cuts and other skin breaks to suberize. Ed.]—E.B.O.

- 200 BOARDMAN, A. H. **Paper covered potato clamps.** *Fmr and Stk-Breed.* 1954, **68**, No. 3387, 71, illus.

SWEET POTATOES

- 201 COOLEY, J. S. and others. **Effect of temperature and duration of storage on quality of stored sweetpotatoes.** *Econ. Bot.* 1954, **8**, No. 1, 21-8, bibl. 7. [Pl. Industr. Bur., U.S. Dep. Agric., Beltsville, Md]

The results are given of trials to determine the effect on quality of storing the tubers of 6 sweet-potato varieties at temperatures of 50, 55 and 60° F. for 3, 5 or 7 months. Average percentages of sound tubers after storage for 3 months at 50, 55 and 60° F. were 82.4, 87 and 86.1, respectively; after storage for 5 months, percentages were 49.3, 82.3 and 83.8, while after storage for 7 months, percentages were 20.3, 74.6 and 80.2, respectively. Porto Rico tubers stored significantly better than the other varieties, except Big Stem Jersey. Data are also given show-

ing the effect of storage on weight loss, sprouting and pithiness. The Orange Little Stem and Maryland Golden varieties suffered considerable loss of weight and increase in pithiness after storage for 5 months; weight loss and pithiness in Big Stem Jersey, Porto Rico and Nancy Hall were relatively low. From these results, it appeared that a storage temperature of 55-60° F. was best, but that variety differences were sufficiently marked to limit considerably the period of safe storage in certain varieties.—P.J.B.

CASSAVA

- 202 BOLHUIS, G. G. **The toxicity of cassava roots.** *Neths J. agric. Sci.* 1954, **2**, No. 3, 176-85, bibl. 15. [Lab. Trop. Agric., Wageningen]

The literature dealing with factors influencing toxicity in cassava roots is reviewed. The factors suggested in the literature are listed as: (a) soil and climatic conditions, (b) yield capacity of the clone, (c) age of the plant, (d) size of roots, (e) special methods of cultivation, e.g. planting upside down, (d) colchicine treatment of cuttings, (g) bud variation. The lack of conclusive evidence as to the influence exerted by these factors is emphasized.—W.J.B.

FIBRE CROPS

COTTON

- 203 BRIKHE, A. La culture irriguée du cotonnier dans le Gezira soudanais. [**Cotton cultivation under irrigation in the Sudan Gezira.**] *Bull. agric. Congo belge* 1954, **45**, No. 3, 615-70, bibl. in text, illus.

The general information given on cotton cultivation in the Gezira was obtained during a visit there.—E.B.O.

- 204 STROGONOV, B. and others. [**Pocket sowings of cotton on salty areas.**] [Russian] *Hlopkovodstvo (Cott. Gr.)* 1954, **4**, No. 7, 31-5, illus.

The tests were carried out during 1950-2 on the light grey/brown earth of the steppe in Azerbaïdžan with the cotton variety 1363 [species not mentioned]. On the plots, 6 furrows were made, 30 m. in length with 70 cm. between each. Three of the furrows were sown with the usual line sowings and three with pocket sowings, the pockets being 35 cm. apart, with 8 to 10 seeds in each. Under the cultural treatments described, there is evidence that cotton yields from the pocket sowings are greater than those from line sowings, the increase being greater the higher the salt concentration of the soil. For example, in line sowing on soil with 0.17% salt in the 0-100 cm. layer, yield of

raw cotton was 2410 kg./ha.; with 0.42% salt, yield was 690 kg./ha. On the other hand, with pocket sowing on soil with 0.17% salt, yield of raw cotton was 2650 kg./ha. while with 0.46% salt, yield was 1470 kg./ha. There is also evidence that pocket sowings of cotton seed results in an intensification of the activity of soil micro-organisms, by which the effect on plants of salinity is ameliorated.—M.H.

- 205 GAVRILOV, G. [New early-ripening varieties of cotton for districts in the Kara-Kalpak Autonomous Republic.] [Russian] *Hlopkovodstvo (Cott. Gr.)* 1954, **4**, No. 7, 40-5.

This Autonomous Republic is within Uzbek SSR where highly productive and early ripening new varieties of *Gossypium* sp., adapted to the soil and climatic conditions of the region, are characterized by a short vegetative period with resistance to strong winds, swampy conditions and saline soils. The varieties KK-351, KK-602, KK-1086, KK-1543, KK-1083 and KK-1507 are adapted to the northern part of the Republic while for the central and southern areas the varieties KK-1171, KK-1576 and KK-1506 are recommended. Details of the varieties' characteristics and yields are supplied. They compare favourably with those of the variety 1306-DV grown in the area from an earlier date.—M.H.

- 206 STANSBURY, M. F. and others. **Cottonseed contents variation. Influence of variety and environment on oil content of cottonseed kernels.** *J. agric. fd Chem.* 1954, **2**, No. 13, 692-6, bibl. 16. [South. Reg. Res. Lab., New Orleans, La]

Data are given of the oil content of the kernels from 8 cotton varieties, grown in 13 States of the southern USA during 1947-9. The mean oil content of the moisture-free kernels ranged from 26.8 to 43.4%. Acala 1517 W and Stoneville 2B had the highest oil contents among the varieties, while Deltapine 15 and Acala 4-42 had the lowest oil contents. Studies were made of correlations between the oil content of the kernels and temperatures during the following growth periods: (a) squaring, 21 days before average date of flowering, (b) fibre length development, 17 days after average date of flowering, (c) maturation, 35 days after period (b) up to the average date of boll opening, (d) combination of periods (a) and (b), (e) combination of periods (b) and (c), and (f) combination of periods (a), (b) and (c). These calculations were made on a basis of "years-in-locations", rather than on an over-all location basis. The highest correlation with oil content was obtained for mean maximum temperatures at period (c); correlations at periods (a) and (b) were not significant. Correlations between oil content and total rainfall at each of the above 6 periods were positive and were significant in the case of periods (c) and (f). There

were no significant differences between varieties in their response to temperature and rainfall. Maximum temperature and rainfall appeared to be very nearly equal in importance in their effect on oil content under the conditions of these trials. The following percentage contributions of different environmental factors influencing the oil content of the kernels were calculated: 6.88% due to rainfall and maximum temperature between locations, 36.98% due to other environmental differences between locations, 26.07% due to rainfall and maximum temperature differences within a location and 30.07% due to other environmental differences within a location.—P.J.B.

- 207 ELDER, W. C. and others. **Chemical control of weeds in cotton.** *Bull. B-397. Okla. agric. Exp. Sta.* 1953, pp. 11, illus.

Recommendations, based on work carried out at the Oklahoma Agricultural Experiment Station, are given for pre- and post-emergence weed control in cotton, using CMU, CIPC and DNOSBP.—P.J.B.

- 208 WALKER, R. L. and HAIDARI, H. S. **Effectiveness of certain insecticides against the spiny bollworm in Iraq.** *J. econ. Ent.* 1954, **47**, No. 2, 367-9. [Abu Ghraib Exp. Fm, Iraq]

Endrin, Dieldrin and Toxaphene gave good control of the spiny bollworm (*Earias insulana*) and excellent increases in cotton yields. Endrin at 1-2 lb. per acre was the best treatment.—E.B.O.

- 209 GLICK, P. A. and LATTIMORE, W. B. **The relation of insecticides to insect populations in cotton fields.** *J. econ. Ent.* 1954, **47**, No. 4, 681-4, bibl. 4. [Texas Agric. Exp. Sta.]

Toxaphene-sulphur dust, applied after 2 early-season Toxaphene-DDT sprays, gave the lowest population of injurious insects and the highest population of beneficial insects.—From authors' summary.

- 210† STROGOV, B. P. [Growth intensity and structure of roots in crops on salty soils.] [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR)* 1954, **98**, No. 2, 285-8, bibl. 3, illus. [Timirjazev Inst. Pl. Physiol., Acad. Sci. USSR]

The work carried out in 1950-1 on *Gossypium hirsutum* by the Kura-Araksian Expedition at a cotton State farm in the Azerbaïdžan steppe is reported. It is claimed that, by the technique described, the action of the different salt concentrations (in the various soil layers) on root growth and on the accumulation of dry matter in the root can be studied.—M.H.

- 211 EGGLE, D. R. **Utilization of storage sulfur by cotton and the effect on growth and chloro-**

plast pigments. *Bot. Gaz.* 1954, **115**, No. 3, 225-34, bibl. 11, illus. [Texas Agric. Exp. Sta., College Station]

The present study is an investigation of the translocation and utilization of sulphate in cotton, grown in culture solution, when the supply of sulphate is cut off. After 20 days in a sulphate-free solution, stems, petioles and roots lost almost all their sulphate; the initial leaves lost 70% of their original sulphate; the remaining 30% appeared to be an irreducible minimum. Old leaves developed normally, but new ones became chlorotic and dropped off; bolls also dropped off. The fact that cotton requires a continuous supply of external sulphur for normal growth indicates the need for using sulphate-containing fertilizers on cotton crops.—D.B.

- 212 APPLING, E. D. and GIDDENS, J. **Differences in sodium and potassium content of various parts of the cotton plant at four stages of growth.** *Soil Sci.* 1954, **78**, No. 3, 199-203, bibl. 7. [Univ. Georgia, Athens]

Cotton was grown on Cecil sandy loam in Georgia, in 1953, with the object of studying the accumulation of Na and K in different parts of the plants at different growth stages. The plots used received the following Na and K treatments: (a) no Na or K, (b) Na₂O equivalent to 72 lb. K₂O per ac., (c) 72 lb. K₂O, (d) Na₂O equivalent to 48 lb. K₂O + 24 lb. K₂O, (e) Na₂O equivalent to 24 lb. K₂O + 48 lb. K₂O per ac. Plants were harvested at the pre-square, full-square, early boll and full-maturity stages and were divided into immature top leaf, lower leaf, stem and root fractions. Seed-cotton yields of plants receiving treatments (a), (b), (c), (d) and (e) averaged 324, 580, 1018, 857 and 850 lb. per ac., respectively. The Na and K contents of all plant parts varied directly with the amount of each element applied, except that the K content of plants receiving Na only was higher than that of plants receiving no Na or K. Under conditions of K deficiency in the soil, the greatest Na concentration occurred in the mature lower leaves, followed, in order, by the stems, roots and immature top leaves. The Na content of the plants decreased markedly from the pre-square to the full-square stage and increased again at the fully mature stage. Where soil K was deficient, the meristematic zones of the plants received most K, while Na moved into other parts of the plants.—P.J.B.

- 213 WINTERBOTTOM, W. T. and SAYRE, C. B. **Mechanization in cotton growing.** *World Crops* 1954, **6**, No. 8, 337-40, illus.

The present, and possible future, development of mechanization in cotton-growing in the USA and other countries is reviewed. Special attention is paid to the economics of mechanical picking and the effect of such picking on lint quality.—W.J.B.

FLAX

- 214 CHAKRAVARTI, S. C. **Inhibition of vernalization in *Linum usitatissimum* Linn. by certain synthetic hormones.** *Nature, Lond.* 1954, **174**, No. 4427, 461-2, bibl. 3, illus. [Bot. Dep., Balwant Rajput Coll., Agra, India]

Results are summarized of 8 hours prechilling soaking treatment at room temperature with different concentrations (500, 50, 5, 0.5, 0.05 and 0.005 ppm. in distilled water) of *anaphthaleneacetic* acid, indolylbutyric acid and indolylacetic acid on vernalization in the strain 477-3/2 of the above crop. Date of opening of the first flower on each plant was recorded and the average number of days taken from date of sowing to anthesis (the vegetative cycle) for each treatment was calculated. "Of the three hormones, *α*-naphthaleneacetic acid was found to be the most effective, at all the concentrations, in reducing the period of earliness in flowering. This delaying effect is directly proportional to the strength, since it brings down the earliness of 29.9 days, recorded in plants raised from water-soaked vernalized seeds, to 19.6 days at the lowest, and to -3.7 days at the highest concentration. In plants raised from seeds treated with 500 ppm. of this hormone, there is not only a complete inhibition of flowering induced by vernalization, but also a delay of 3.7 days, which is significant at the 5 per cent level."—M.H.

HEMP

- 215 PESANTE, A. **Anomalie di sviluppo della canapa (*Cannabis sativa* L.) causate da diserbanti selettivi. [Abnormal development of hemp (*Cannabis sativa*) caused by selective herbicides.]** *Ann. Sper. agr.* 1954, **8**, No. 5, 1513-20, illus., English summary p. 1520. [Lab. Sper. Fitopat., Torino, Italy]

The damage to a field of hemp, caused accidentally by a selective herbicide (which was either Weedone or Fenoxilene 30) intended for a contiguous field of wheat, is briefly described. The injured plants were shorter than normal plants and presented morphological and histological abnormalities. These consisted mainly of a different leaf shape, fusion of the leaf-stalks of the 2 uppermost leaves into a tubular organ enclosing the vegetative apex, and poor differentiation of the histological elements, particularly the cortical fibres of the stem, with consequent depreciation in the value of the crop.—E.B.O.

JUTE

- 216 MIA, A. J. **Morpho-histogenesis at the vegetative shoot apex of jute plants of East**

Bengal. Pakist. J. sci. Res. 1954, **6**, No. 1, 12-26, bibl. 54, illus. [Biol. Lab., Dacca Univ.]

A detailed study was made of the shoot apex of the true species *Corchorus capsularis*, *C. olitorius* (cultivated and wild) and *C. acutangularis* (wild) under the following main heads: (a) cellular organization at the shoot apex, (b) origin of leaf primordium, (c) origin of axillary buds, (d) origin and development of stipules, (e) nature of the leaf base and the internode, (f) the ontogeny of protoxylem and protophloem below the growing point.—W.J.B.

KENAF

- 17 BAQUE, D. G. **The performance of five varieties of kenaf.** *Philipp. Agric.* 1953, **37**, No. 3, 130-41, illus.

Observations were made of the germination and other agronomic characters of *Hibiscus cannabinus* var. *viridis*, *vulgaris*, *ruber*, *purpureus* and *simplex*. Dry fibre yields did not differ significantly between varieties. Air-dry seed yields and tensile strength of fibre were significantly better for the variety *simplex* than the others. It was concluded that for commercial use, the varieties *simplex*, *vulgaris* and *viridis* were preferable to *purpureus* and *ruber*. Susceptibility to *Sclerotium rolfsii* was highest for var. *purpureus*.—P.J.B.

GENERAL

- 18 THIEME, J. G. **The theory of fibre extraction.** *Text. Quart.* **4**, No. 3, 175-90, bibl. 50, illus. A brief review is given of the fibrous plants, arranged according to those parts of the plant which yield the fibres.—C.L.S.

OIL CROPS

SESAME

- 19 MAZZANI, B. and MICHELETTI, D. Tetraploides experimentales en especies de *Sesamum*. [Experimental sesame tetraploids.] *Agron. trop., Maracay* 1953, **3**, No. 2, 79-93, bibl. 13, illus., English summary p. 94. [Div. Fitotec., Inst. Nac. Agric., Maracay, Venezuela]

The morphology, oil content, aphid-resistance and isometric data of a tetraploid *Sesamum indicum* obtained by colchicine treatment are described.—J.J.B.

LINSEED

- 220 HOLLY, K. and BLACKMAN, G. E. **Studies in selective weed control. V. The control of weeds in linseed by chlorinated phenoxy-acetic acids.** *J. agric. Sci.* 1954, **44**, No. 2, 173-83, bibl. 25, illus. [Unit Exp. Agron., Univ. Oxford]

Between 1946 and 1950 multifactorial field experiments were carried out to determine the potentialities and effectiveness of chlorinated phenoxy-acetic acids for the selective control of weeds in linseed (oil flax). The initial experiments of 1946 demonstrated that treatment with sodium 2-methyl-4-chlorophenoxyacetate led to considerable increases in the yield of seed through a reduction of the weed population and the consequent decrease in weed competition. The subsequent experiments were undertaken on relatively weed-free crops so that the direct effects on the crop of compound, formulation, and stage of growth at the time of application could be investigated along with differences in varietal response. Amongst the observations made were time of flowering, straw length, the yield of seed, capsule production, seeds per capsule and the weight, oil content, protein content and germination capacity of the seed. At similar dosages sodium methylchlorophenoxyacetate is less phytotoxic than sodium 2,4-dichlorophenoxyacetate while the parent acid and particularly the ethyl ester of the dichloro-compound are much more injurious. With sodium methylchlorophenoxyacetate the tolerance is greatest between the post-cotyledon stage and a height of 20-25 cm.; within this range of plant development dosages up to 3.5 lb./acre have no adverse effects on the yield of seed. Treatment within 2-3 weeks of flowering delays flowering and reduces the seed weight. When dichloro-compounds are employed there are additional effects, such as the formation of abortive capsules or a reduction in the number of seeds per capsule. Under some conditions the oil content and the germination capacity of the seed is depressed but the protein content is increased. Varieties vary in their degree of resistance to these chlorinated phenoxyacetic acids and of the varieties tested Minerva is the most susceptible. There is some evidence that resistance or susceptibility is an inheritable characteristic. On the basis of these investigations recommendations can be put forward for the selective control of weeds in linseed crops.—Authors' summary.

- 221 BURROWS, V. D. **The reaction of flax [linseed] and wheat to various concentrations of wild mustard and to their removal with 2,4-dichlorophenoxyacetic acid.** *Proc. 7th West. Canad. Weed Contr. Conf.* 1953 1954, 73-8. [Univ. Manitoba]

In trials in Manitoba in 1952, linseed was grown alone and in association with wild mustard [*Sinapis arvensis*] populations of 10, 25, 50, 100, 200 and 400 per sq. yd. The linseed was sprayed with 2,4-D butyl ester at a rate of 4 oz. acid equivalent per ac. at 14 days after emergence, when the linseed was 2-3 in. high. In 1952, wild mustard populations of 5, 10, 25, 50 and 100 per sq. yd. were used, with applications of 3 oz. 2,4-D per ac. when the linseed was 1-1.5 in. high, 10 days after emergence. Even low populations of wild mustard reduced linseed yields where no 2,4-D was applied. In 1952 on treated plots, yields tended to decline slightly, owing to reduced basal branching of the linseed, caused by early competition from the wild mustard. In 1953, this effect was not observed, owing to relatively greater branching of the plant tops in this year. The 2,4-D caused slight crop damage in 1952, but not in 1953. From these results it was concluded that linseed should be treated as soon as possible after emergence to control wild mustard. In similar trials with wheat sown at rates of 1, 2 and 3 bu. per ac., increasing wild mustard populations from nil to 400 plants per sq. yd. reduced wheat yields, where sown at rates of 1 and 2 bu. per ac.; where sowing rates of 3 bu. per ac. were used, competition from wild mustard plants did not consistently reduce yields. In 1952, competition from wild mustard plants severely reduced the tillering of the wheat plants before 2,4-D treatments were carried out and the use of 2,4-D did not significantly raise grain yields, showing that 2,4-D should be applied as early as possible during the growth of the wheat.—P.J.B.

SAFFLOWER

- 222 GRAY, S. G. **Experiments with safflower in Southern Queensland** *Tech. Pap. 2. Div. Pl. Industr. CSIRO* 1954, pp. 14. bibl. 8.

Preliminary experiments were carried out at Lawes from 1946-51. Thirty-one strains of safflower were tested and selections for non-spininess and suitability for mechanical harvesting were made. Seed yields obtained at Lawes compared favourably with those obtained in Australia and the USA. The crop is more drought resistant than linseed and should be successful in the drier parts of the Queensland wheat belt, which would be marginal for linseed-growing. The use of early-maturing varieties should reduce storm damage. Varieties are recommended for more extensive trial.—From author's summary.

SUNFLOWER

- 223† GREULACH, V. A. and HAESLOOP, J. G. **Some effects of maleic hydrazide on internode elongation, cell enlargement, and stem**

anatomy. *Amer. J. Bot.* 1954, **41**, No. 1, 44-50, bibl. 16, illus. [Univ. N. Carolina, Chapel Hill]

The plants studied morphologically included sunflower and beans. Maleic hydrazide did not influence the degree of phototropic or geotropic response of these plants. Stem growth was inhibited slightly in 28-day-old sunflower and strongly in 11- and 14-day-old bean plants. Internode elongation was inhibited in bean but not in sunflower. The anatomical studies referred to in the title were confined to tomato.—D.B.

RAPE

- 224† ANHAEUSSER, H. **Zur Echtheitsbestimmung von Raps- und Rübensaatgut. [Determination of purity of rape and turnip seed.]** *Angew. Bot.* 1954, **28**, No. 1/2, 13-40, bibl. 20, illus. [Bad. Staatl. Landw. Versuchs- u. Forschungsanstalt, Augustenberg, Germany]

An attempt was made to distinguish between seed of *Brassica napus* and *B. rapa* var. *silvestris*, both the oil-crop and fodder-crop types, by microscopic examination of the seed coat. The characters studied were type of surface reticulation and the size of the lumen of the palisade cells. The samples examined showed many examples intermediate between these two species so that the anatomy of the seed coat was not considered to be a good criterion for determining purity of seed. Microscopic examination of seed and seedling under ultraviolet light also proved to be an uncertain criterion. The method of Eifrig, based on morphological characteristics of the seedling, such as the shapes of the cotyledon, the first foliage leaf and the leaf hairs, remains the truest method for distinguishing between seeds of these species.—D.B.

- 225 BONNEMAISON, L. and JOURDHEUIL, P. **Essais de traitement des semences de crucifères oléagineuses contre les altises. [Experiments in the treatment of seeds of oily crucifers against flea-beetle.]** *C.R. Acad. Agric. Fr.* 1954, **40**, No. 13, 491-3, bibl. 5 in text. [Sta. Cent. Zool. Agric., Versailles]

Phyllotreta sp. attacks spring crucifers; winter crucifers are attacked by *Psylliodes chrysocephala*. Tests with colza showed that dry dusting of the seeds with Lindane most effectively controlled attacks, and had no phytotoxic effect. In a mild autumn a further treatment with Lindane is recommended when the plants are beyond the two-leaf stage.—M.P.

- 226 STOLLE, G. **Ein Beitrag zur Ertragszüchtung beim Winterraps. [A contribution to the breeding for yield of winter rape.]** *Züchter*

1954, **24**, No. 7-8, 202-15, bibl. 16, illus.

[Zentralforschungsanstalt für Pflanzenzucht, Müncheberg/Mark, E. Germany]

To increase the yield of oil from winter rape [*Brassica napus* var. *oleifera* sub. var. *biennis*] varieties should be selected for a high seed yield rather than for a high oil content.—D.B.

BURDOCK

- 227 BRØNDEGAARD, V. J. Burre—en ny Kulturplante? [**Burdock—a new crop?**] *Ugeskr. Landm.* 1954, **99**, No. 42, 657-9, illus.

A note is given on trials with burdock (*Arctium* sp.) in Germany, where it has been studied with a view to its use as a producer of hardening oil and as a bulk material (stems) for fabricating pressed board. Average yields of seed in Germany have been 4668 kg. per ha., with an oil content of 15.6%. Dry-weight yields of stems have been 12,000 kg. per ha. Among problems in the cultivation of the crop are the high proportion of hard seed (20-25%) and the tendency for the seed-pod to shatter.—P.J.B.

OTHER CROPS

- 228 GARCIA, M. J. Estudio químico de la cañihua (*Chenopodium pallidicaule*, Aellen). [**Chemical study of cañihua** (*Ch. pallidicaule*).] *Informe 85 Esta. exp. Agric., Peru* 1953, pp. 20, bibl. 6, illus.

Trials were carried out in the Puno region of Peru to ascertain the yield of *Ch. pallidicaule*, the seed of which may be used as a substitute for cereal grain. The nutritional value of the seed and foliage of the plant was also determined. *Ch. pallidicaule* is a semi-erect plant, 25-60 cm. high, resembling, but shorter than, *Ch. quinoa*. It grows in the cool regions of Peru at heights of 3500-4000 m.a.s.l. Seed of *Ch. pallidicaule* was sown in October, 1951, at the beginning of the rainy season. The sowing rate for seed sown in rows was 8-10 kg. per ha. The period sowing to harvest lasted 120-150 days. Yields of seed varied from 2000-3000 kg. per ha. The seed, which is used for human consumption, contained 15% protein and 58% carbohydrate; it was rich in Ca (0.65% CaO), P (0.37% P_2O_5) and in the vitamins thiamine, riboflavine and niacin. The foliage is considered useful fodder for cattle. It is recommended that the area sown with cañihua in the Peruvian uplands should be extended.—W.J.B.

LAND USE, SURVEYS AND MANAGEMENT

- 229† FARMER, B. H. **Problems of land use in the dry zone of Ceylon.** *Geogr. J.* 1954, **120**, No. 1, 21-33, illus.

- 230 SMITH, R. M. and others. **Soil organic matter, crop yields, and land use in the Texas Blackland.** *Soil Sci.* 1954, **77**, No. 5, 377-88, bibl. 17. [Texas Agric. Exp. Sta., College Station]

Studies are reported of changes in the organic matter and N content of blackland clay soils of Texas and their relation to crop productivity. The data given refer to soil for 60 years under row-crop farming and native grassland and to soil with the top 22 in. of soil removed. Data are also given of maize yields and soil organic matter contents on plots under 20 years' continuous maize cropping and the soil organic matter trends of plots under 3- and 4-year crop rotations. On the basis of an annual supply to the soil of 20 lb. N per ac. through rainfall and non-symbiotic N fixation, under conditions of continuous row-cropping by normal farming methods, which were calculated to involve the annual loss of 1.5% of the organic matter in the plough layer, an absolute equilibrium soil organic matter content of 1.33% was predicted. With erosion control and the preservation of favourable soil conditions, it was considered possible to grow

row crops continuously for an indefinite period on the soils studied, with adequate N and P applications. Where 60 lb. of N per ac. per year were supplied, it was considered possible to maintain soil organic matter contents of 2%, with average maize yields of about 50 bu. per ac., which is approximately the yield limit permitted by rainfall in this area.—P.J.B.

- 231 WEAVER, J. C. **Crop-combination regions for 1919 and 1929 in the Middle West.** *Geogr. Rev.* 1954, **44**, No. 4, 560-72, map 1. [Geogr. Dep., Univ. Minnesota]

Maps of mid-western crop-combination regions at the crop seasons of 1919 and 1929 are presented and discussed. They were assembled from county-unit data obtained during the Federal Agricultural Censuses of 1920 and 1930. The purpose of the data given is to provide a background for similar maps given for 1939 and 1949, reported in *Fld Crop Abstr.* 7 : 1004.—P.J.B.

- 232† BUGAEV, N. [**Land utilization in the collective farms of the southern Urals.**] [Russian] *Soc. sel's. Hoz. (Social. Agric.)* 1954, **25**, No. 6, 48-54.

The Soviet plan for developing grain husbandry in Russia on a large scale [see also Zabaznyi, Abs. 1] has drawn attention to the great reserves of soil fertility which lie in the southern Urals (including parts of the Čkalov Province, Baškir ASSR, and the Čeljabinsk Province) where almost 9 million hectares are suitable for collective farms in a region which is predominantly steppe land.—M.H.

- 233† FILATOV, N. [Utilization of virgin lands and grain production in Kazakhstan.] [Russian] *Soc. sel's. Hoz. (Social. Agric.)* 1954, 25, No. 7, 9-22.

A history is given of past and present agricultural development in Kazakhstan, with special reference to the plans in USSR for developing the grain areas in north and north-east Kazakhstan where the following vegetation zones are distinguishable: (a) mixed grasses of the forest/steppe on medium chernozems with average moisture; (b) dry steppe on southern chernozems; and (c) feather-grass (*Stipa* sp.) dry steppe on dark chestnut soils.—M.H.

- 234† RUSSELL, E. J. **Agriculture [of the Oxford region].** [Contained in] **The Oxford Region, a scientific and historical survey.** 1954, Chap. 13, 132-40, bibl 9, Publ. for Brit. Ass. by Univ. Press, 25 × 18.5 cm.

- 235 CROMPTON, E. and OSMOND, D. A. **The soils of the Wem District of Shropshire.** [Sheet 138.] *Minist. Agric. Fish. Mem. Soil Surv. Gt Britain* 1954, pp. 79, London; H.M. Stationery Office, map.

The survey includes a chapter on agriculture which consists of a brief summary of the farming history of this District from the Stone Age to the present day and an account of modern farming. There are two main farming systems, known respectively as the Shropshire system and the dairying system. The former is chiefly arable, with some sheep or cattle; the latter is either purely dairying or is supplemented with cereal, beet and potato crops.—D.B.

- 236† WYLLIE, J. **Land requirements for the production of human food.** *Wye Coll. Dep. agric. Econ.* 1954, pp. 38 + append., bibl. 6, illus.

The paper deals with the acreage of crops and grass required to feed one person for a year in the U.K., in selected pre-war, war-time, and post-war periods. On the basis of an allowance of one million calories per average person p.a., the required acreage varied and was about 1.27 ac. in 1949-50, when 23.8 million people were fed off U.K. crops and grass. The percentage composition of annual calorie production and total number of persons fed annually

off U.K. grass and crops also varied considerably. The cost per million calories was higher in animal products than in crop products. Mechanization, greater use of fertilizers and improved farm management has led, in recent years, to increased calorie production per man engaged in agriculture.—M.P.

- 237 POURTAUBORDE, J. **L'exploitation agricole du périmètre irrigué des Beni Amir. [The agricultural exploitation of the irrigated area of the Beni Amir.]** *Terre maroc.* 1954, 28, No. 296, 237-40.

The irrigated land of the Beni Amir, Morocco, (27,000 ha. in 1954) consists mostly of units, averaging 3.5 ha. each, owned by fellahs under French supervision. There are also some pilot farms. The 50 tractors of this undertaking are used co-operatively. The land of each unit is divided into 5 fields of which 1 is under lucerne lasting 4 years, and the others under a rotation of crops. These crops are: soft wheat, sown in November at the rate of 100 kg. per ha.; beans, sown in rows in October at the rate of 30 kg. per ha., yielding on an average 3000 kg. per ha.; cotton sown in rows at the end of March at the rate of 30 kg. per ha. (corresponding to approximately 100,000 plants per ha.), yielding on an average 3200 kg. per ha.; durum wheat, sown at the end of December, after the cotton harvest, at the rate of 100 kg. per ha. Berseem (*Trifolium alexandrinum*), sown in August after soft wheat, before cotton, is recommended. This should be cut in November and ploughed under for green manure in January. All the above crops, durum wheat excepted, are irrigated. The average yearly consumption of irrigation water (including that given to fruit trees) is 8000 cu.m. per ha. Irrigation will be gradually extended in the Beni Amir-Beni Moussa over an estimated area of 120,000 ha. [See also *Fld Crop Abstr.* 4 : 476].—E.B.O.

- 238† BARBOUR, M. **The Wadi Azum.** *Geogr. J.* 1954, 120, No. 2, 174-82, illus.

An account is given of the lives and environment of the people in this area of the Darfur province in the Sudan. Dura [*Sorghum vulgare*] is the chief crop cultivated on the alluvial terraces along the main stream, dukhn, bulrush millet [*Pennisetum typhoides*], being grown on sandier soil. Cotton is grown on the clayey areas and is treated as a perennial crop. Sesame, chillies and bamia (*Hibiscus esculentus*) are grown in summer on stony patches amongst the acacia scrub, and groundnuts on the sandiest soil near the wadi. Around the Zalingei, irrigated potatoes are a winter crop. No fodder crop is grown, but dura stalks are grazed after harvest and the seed pods of *Acacia albidia* supplement the fodder of goats and cattle.—M.P.

39 NYE, P. H. **A survey of the value of fertilizers to the food-farming areas of the Gold Coast. Part 3. The Voltaian sandstone region and the southern maize areas.** *Emp. J. exp. Agric.* 1954, **22**, No. 85, 42-54, bibl. 5.

A large number of small trials with sulphate of ammonia and superphosphate on cultivators' farms has been conducted on the main crops of two regions in central and south Gold Coast. In the Voltaian sandstone region it was shown that 20 lb. per acre of sulphate of ammonia would increase the present yields of cereals by 28% ; 20 lb. per acre of superphosphate increased the yield of cereals by 18%, and, possibly owing to its sulphur content, it raised the yield of groundnuts by 47%. The poor response to phosphorus was in marked contrast to [the response in] the northern granitic region. Differences in responses between the four areas of the [sandstone] region and the effects of the previous cropping history upon the responses were examined : suggestions were made for the use of sulphate of ammonia on cereals and of superphosphate on groundnuts. In the southern maize areas the trials were upset by a severe attack of rust, but indications of substantial responses to superphosphate and moderate responses to sulphate of ammonia were obtained. Estimates were made of the economic value of the fertilizers in the two regions.—From author's summary.

40 GUILLAUME, A. La mise en valeur de la vallée du Niari. [**The improvement of the Niari Valley.**] *Agron. trop.*, Nogent 1954, **9**, No. 3, 324-62, illus., English and Spanish summaries pp. 361-2.

In the Niari Valley, Middle Congo, French Equatorial Africa, the soil is fertile and the climate comparatively dry. There are 2 dry seasons per annum. Information is given on the agricultural development of this region, which is only in its early stages.—E.B.O.

41 SHEPARD, C. Y. **Agriculture in British Honduras.** *Colon. Devel.* 1954, No. 19, 28-31.

Primitive, Mayan system of shifting cultivation still largely practised. The population of British Honduras is small in relation to the land available; about 65,000-70,000 ac. only are cultivated annually. Maize, roots and legumes are the chief crops. Schemes are in progress for the development of a more permanent system of agriculture, including rice production, pasture improvement and the establishment of small to medium-sized farms.—E.B.O.

42 ARGENTINA. Ministry of Agriculture. Cartilla agrícola-forestal de la Provincia de Buenos Aires. [**Guide to agriculture and forestry in the Province of Buenos Aires.**] *Publ. Misc.* 370. *Minist. Agric., Argent.* 1953, pp. 281, illus.

The soils, climate, agriculture, horticulture and forestry of the 16 agro-climatic zones into which the Province is divided, are described in detail. The performance of 14 field crops in various parts of the Province is recorded and illustrated by maps ; cultivation-techniques and the varieties used are described for each crop.—W.J.B.

243 De FINA, A. L. Reconocimiento agroecológico por medio de una serie prefijada de plantas cultivadas. [**Agroecological survey by means of a series of index crops.**] *Tirada Interna* 7. *Inst. Suelos Agrotec., Buenos Aires* 1947, pp. 21. [Received August, 1954]

Practical recommendations are given for carrying out an agro-ecological survey of an area, using index plants. [See *Fld Crop Abstr.* 7 : 1001.]—W.J.B.

244 De FINA, A. L. and GARBOSKY, A. J. Difusión geográfica de cultivos índices en la Mesopotamia Argentina y sus causas. [**The geographical distribution of index crops in the Argentinian Mesopotamia in relation to causative factors.**] *Tirada Interna* 10. *Inst. Suelos Agrotec., Buenos Aires* 1948, pp. 9, bibl. 9, illus. [Received August, 1954]

The Mesopotamian region of Argentina (between the rivers Paraná and Uruguay) is divided into 8 agroclimatic districts according to de Fina's system. [See *Fld Crop Abstr.* 5 : 543.] The results of an agro-ecological survey of the region based on information on the abundance and performance of 18 index plants, are presented. The index plants comprise 12 perennials and 6 annuals : cotton, maize, wheat, oats, barley and melon. The abundance and performance of each index plant is illustrated by a separate map and discussed with reference to climatic and other environmental factors.—W.J.B.

245 ARENA, A. Reconocimiento agrológico de la zona de riego de Río Segundo (Prov. de Córdoba). [**Agrological survey of the Río Segundo irrigable zone in the Province of Córdoba.**] *Tirada Interna* 8. *Inst. Suelos Agrotec., Buenos Aires* 1948, pp. 12, illus. [Received August, 1954]

As a result of the survey it is recommended that as much as possible of the region, which has an excellent soil suitable for lucerne and cereals, should be irrigated.—W.J.B.

246 WIBBERLEY, G. P. **The challenge of rural land losses.** *J. roy. Soc. Arts* 1954, **102**, No. 4929, 650-63, bibl. 10.

The assessment of the value of land in terms of agricultural and building economics and the difficulties encountered are discussed. The concept of the food replacement value of agricultural land lost to urban growth is put forward as an alternative method of evaluation.—M.P.

FARMING SYSTEMS AND PRACTICES

- 247 BAARS, C. De kunstmatige beregening op de droogtegevoelige zandgronden. [**Overhead irrigation of sandy soils sensitive to drought.**] *Landbouwk. Tijdschr., Wageningen* 1954, **66**, No. 9, 625-33, illus. [Cent. Inst. Agric. Res., Wageningen]

The results for the first year of an experiment carried out in North-Brabant, Neths, to determine the influence of overhead irrigation on the yields of crops growing on 3 soils of varying sensitivity to drought are presented and discussed. The soils (all sandy) are : (a) soil insensitive to drought with a water-table 1.25 m. below the surface, (b) high-lying soil sensitive to drought with a water-table 3 m. below the surface, (c) soil very sensitive to drought with a water-table 3 m. below the surface (a gravel layer underlies this soil about 30 cm. below the surface). The crops grown were grass, barley, oats, maize, potatoes and fodder-beet. On soil (a) yield increases were obtained by irrigation in the case of potatoes and fodder-beet only (4 and 2%, respectively). On soil (b) yield increases obtained by irrigation in the case of the 6 crops mentioned were 23, 23, 6, 4, 11 and 32%, respectively. On soil (c) comparable percentage increases were 29, 108, 43, 50, 20 and 51%, respectively. In the case of grass, barley and oats, the yields from soil (c), when irrigated, exceeded those from soil (a). It is concluded from the results that the irrigation of soil (c) would be profitable and that the irrigation of soil (b) might be profitable. It was also calculated that the average quantity of irrigation water required on drought-sensitive sandy soils would be about 100-150 mm. per season. The economics of overhead irrigation in the Netherlands are discussed.—W.J.B.

- 248 PENMAN, H. L. **Estimation of irrigation need.** *Paper read at Meet. Brit. Ass. Sect. III. Oxford Sept., 1954.*

The calculation of irrigation need is based on the study of the physical factors controlling natural evaporation, and these physical factors in turn are based on two fundamental principles that must apply to the process of transpiration. First, liquid water is taken in by the roots but reaches the atmosphere as vapour, so the process involves a change of state that demands an energy supply for the necessary heat of vaporization. Second, the vapour has to be carried away from the crop, so the process demands a transport and mixing mechanism for the uptake of the vapour in the atmosphere over the crop. Out of doors, the source of energy is solar radiation, and the transport and mixing are caused by atmospheric turbulence. Use of existing knowledge leads to the conclusion that the water use by crops is dictated

by prevailing weather, and can be calculated for a given place and period from knowledge of duration of sunshine, air temperature, air humidity, and wind speed. This rate of water use—known as the “potential transpiration” rate—is predicted to be substantially the same for all crops. There is some direct and some circumstantial evidence that plant type is an unimportant variable, but more experimental evidence is needed. Accepting it, however, as at least a reasonable working hypothesis, the concept of “potential transpiration” immediately becomes of great practical value in the control of irrigation operations.—Author's summary.

- 249† BAARS, C. Vragen en moeilijkheden op landbouwkundig gebied bij toepassing van kunstmatige beregening in de praktijk. [**Problems and difficulties in connexion with spray irrigation.**] *LandbVoorl.* 1954, **11**, No. 6, 270-6, illus. [Cent. Inst. Agric. Res., Wageningen]

Practical advice is given on methods of estimating quantities of water to be applied by spray irrigation. On large holdings it is recommended that the moisture deficiency of the soil (for the given plan cover) should be calculated according to Thornthwaite's method, using an evaporation meter. On small holdings on sandy soil in the south-east Netherlands where the above method would require excessive time, it is recommended that irrigation water should be applied whenever the moisture content of the soil (to ploughing depth) falls below a level mid-way between field capacity and wilting point. The small-holder must be able to recognize the critical level of moisture content by eye. The phase of plant growth at which each crop suffers a maximum moisture loss must also be known. For the crops listed this phase occurs at the following periods, respectively : cereals, about 3 weeks before shooting of the ear ; potatoes, from first flowering to dying off of leaves ; beet, end June-end August ; maize, from 3 weeks before to 3 weeks after tasselling ; grass, throughout growing period. Sufficient irrigation water should be applied at a time to saturate the whole of the portion of soil where roots are concentrated. The use of small sprayers (giving a rain-intensity of 4 mm. per hr.) is advocated on the grounds that low-intensity sprays are less likely to cause panning of the soil-surface than high-intensity sprays. Low-intensity sprays are also sufficient to prevent damage to early potatoes by night frosts.—W.J.B.

- 250† TURCK, G. and WHITE, J. E. **Small scale irrigation in Southern Rhodesia. K. Irriga-**

tion structures and equipment. *Rhod. agric.* J. 1954, **51**, No. 2, 119-30, illus.

251† BOSCHI, V. Ricerche sull'irrigazione di soccorso in casse da vegetazione lisimetriche. [Investigations on auxiliary irrigation in lysimeters.] *Ann. Sper. agr.* 1954, **8**, No. 4, 1117-39, bibl. 8, illus., English summary p. 1138. [Sta. Agr. Sper., Modena, Italy]

Preliminary trials were carried out to study the effects of auxiliary irrigation, given in summer, to the crops of an ordinary rotation, including lucerne, sugar-beet, oats, grain maize and fodder maize, grown in lysimeters in 3 characteristic types of soil of the Emilia Plain (i.e. a clay-compact soil, a siliceous-clay soil of medium consistency and a red soil) under conditions considered similar to those of the field. The main conclusions were that this type of irrigation gives increases in yield of up to 100%, or more, compared with the yield from non-irrigated crops, and leaves the soil in the best condition for the autumn cultivation.—E.B.O

252 DUBEY, J. K. **Origin, morphology and agricultural characteristics of the regur or black cotton soils of India.** *Paper read at Meet. Brit. Soc. Soil Sci., Wye Coll. September, 1954* pp. 7, bibl. 7.

[For a further account of this paper see Abs. 271.] An account is given of regur soils in India, some of which, although cultivated for over 2000 years, without manuring, continue to give good crops. After heavy rain, regur soils become very sticky and impassable, but, if subjected to 1-2 days' sunshine, the top 4 in. become workable and can be cultivated by bullock-drawn harrows. Usually 3-6 harrowings are given. For tractor cultivation, a minimum period of 60-70 hr. sunshine is necessary before the land can support the additional weight. Delay in harrowing allows clods to form and prevents the formation of a good seed-bed. When there is a sufficiently long break in the rains for the soil to become workable to a depth of 6-8 in., bullock-ploughing can be done and sowing carried out with a drill attached behind the plough. On deep black-cotton soils, wheat, pulses and groundnuts are the usual crops; cotton, millets, linseed and sugar-cane are grown on the shallower soils.—C.L.S.

253 TROPICAL AGRICULTURE, TRINIDAD. **Development of mechanized farming in Uganda.** *Trop. Agric., Trin.* 1954, **31**, No. 4, 281-5.

Schemes designed to test the possibilities of mechanized farming in Uganda, both in populated areas and in areas of new settlement, are described. Two types of schemes are outlined: (a) hiring of tractors and implements to individuals or to groups of farmers, (b) schemes for opening up uninhabited rain forest and low-bush areas. In schemes (b), at

Busoga and Bungoro) specially formed companies clear the areas and carry out mechanical cultivations. It is intended to organize these settlements on a tenancy basis, with the companies providing machinery, implements, and those services requiring considerable capital.—W.J.B.

254 ANDERSON, E and WILLIAMS, L. O. **Maize and sorghum as a mixed crop in Honduras.** *Ann. Mo. bot. Gdn* 1954, **41**, No. 2, 213-15, illus.

255 RUMJANCEV, V. I. [Dense mixed sowing of silage crops and annual grasses in fodder rotations of the south-east Volga area.] [Russian] *Izv. Timirjazevsk. seljshoz. Akad.* (*Bull Timirjazev Agric. Acad.*) 1954, No. 1(5), 99-106.

Rotations of crops (which include pure sowings and mixtures of sunflower, Sudan grass and oats) in collective farms of the region are described. These three crops are recommended in mixture (in kg./ha., sunflower 20; oats 30; Sudan grass 15) to obtain high yields of green mass (over 9000 kg./ha.) for ensilage.—M.H.

256 WAHAB, A. and MUHAMMAD, T. **The role of legumes in improving soil fertility.** *Pakist. J. sci. Res.* 1954, **6**, No. 1, 37-44, bibl. 58, illus. [Punjab Agric. Coll.]

The influence on the N, P, K and Ca content, C/N ratio, pH value, physical composition and structure of the soil of 3 summer crops (*Cyamopsis psoraloides* Phaseolus *aconitifolius* and sorghum), summer fallow, 3 winter crops (*Trifolium alexandrinum*, wheat and gram [species not stated]) and winter fallow, was studied in a replicated experiment. The cultivation of legumes increased the availability of P and Ca in the soil compared with non-legumes. In the case of both summer and winter crops the N content of the soil after harvest was slightly lower than before harvest (this applied to legumes as well as to non-legumes) but in the case of fallows, the N content of the soil was slightly higher at the completion than at the initiation of the fallow period. The effects of the various crops on the soil characteristics mentioned are tabulated.—W.J.B.

257† SMIRNOV, M. I. [The introduction of strip cropping in steppe regions where there is little snow.] [Russian] *Zemledelie (Agriculture)* 1954, No. 4, 30-1.

With regard to the effort in USSR to increase crop yields and extend the areas devoted to animal husbandry, attention has been drawn to the steppe region where the need for shelter from the winds and for measures to conserve moisture cannot be met by the erection of shelter-belts because transport of material for their construction is un-

economic. The sowing of strip crops is recommended on fallows and also on areas where the stubble of spring crops is left to hold snow. The strip crops, which should be chosen with special regard to local conditions, include the following: maize, sunflower, sorghum, African millet, *Brassica* sp., *Melilotus* sp., *Cannabis* sp., *Onobrychis* sp., Sudan grass, lupin, safflower, etc. Strip crops may be sown at the same time as the spring crops. The first strip sowing in Kokčetaev Province [north Kirgiz steppe] was made at the Kellerovsk Experimental Centre, from where results of the test are awaited.—M.H.

258† MEIJERMAN, G. C. De ontwikkeling van de bedrijfsuitkomsten in de laatste jaren op weidebedrijven, gemengde en akkerbouwbedrijven. [**Profitability in recent years of grassland, arable and mixed farms (in the Netherlands).**] *Landbouwk. Tijdschr., Wageningen* 1954, **66**, No. 8, 555-63, illus.

259 WHITT, D. M. **Comparison of pasture and grain farming on claypan soil.** *Res. Bull.* 505. *Univ. Missouri agric. Exp. Sta.* 1952, pp. 43, bibl. 20.

Data are given of crop yields and economic returns, runoff and soil erosion from a mid-western USA claypan soil under a number of pasture and cash grain-cropping systems, receiving two levels of manurial treatments.—P.J.B.

260† BALCHIN, W. G. V. and PYE, N. **Recent economic trends in Arizona.** *Geogr. J.* 1954, **120**, No. 2, 156-73, bibl. 35, illus.

Under natural conditions only a desert type of vegetation can survive at the lower altitudes. Irrigation has enabled good use to be made of the semi-arid alluvial lands. Of the State's total land acreage, 1.5% is devoted to agriculture, the water necessary for irrigation coming mostly from ground-

water reservoirs. Small grains and lucerne are grown on the irrigated lands, mainly for cattle feed. The main cash-crop is cotton and the acreage devoted to it has increased greatly since 1950. Formerly grown only on alluvial lands, it is now increasingly grown at higher altitudes. The average yield of 741 lb. per ac. is by far the highest for any state in the USA. Upland cotton is mainly grown with some American-Egyptian cotton, but the latter is not favoured for financial reasons. The introduction of mechanization has greatly reduced the amount of Indian labour employed to hand-pick the crop. The rest of the available land is grazed; at 3000-5000 ft. the grasses are most abundant and provide grazing all the year round, 20-40 ac. being required to support each animal unit. Most crops and livestock are exported.—M.P.

261 PAUL, H. and SHARIFF, M. A. A. **The rates of nitrification of peat soils in British Guiana.** *J. agric. Sci.* 1954, **44**, Pt. 4, 377-82, bibl. 8.

A large proportion of food crops, particularly root crops, are grown in British Guiana on peat soils without fertilizers. Continuous cropping for 2-3 years has been found to impair productivity. Soils exhausted in this way lacked nitrate N and had a higher amount of ammonia N than virgin soils. Addition of ammonium salts showed that the nitrifying power of the exhausted soil was very low. The yield of sweet-potatoes was twice as great on the virgin soil as on the exhausted soil, and, though the addition of fertilizers increased yields on both soils, the increases were not significant.—M.P.

262 HALLSWORTH, E. G. and others. **The nutrient status and cultivation practices of the soils of the north-west wheat belt of New South Wales.** *Aust. J. agric. Res.* 1954, **5**, No. 3, 422-47, bibl. 14, illus.

SOIL AND WATER CONSERVATION

263† CONDON, R. W. **Sand drift control on Coomealla irrigation area.** *J. Soil. Conserv. N.S.W.* 1954, **10**, No. 3, 109-15, illus.

Clearing of trees and scrubs for agricultural development in the Coomealla irrigation area has led to extensive sand blowing. Rye is recommended as the best cover crop for the control of sand blowing. The crop should be sown in April at a rate of 40 lb. per ac. to enable it to become established before the beginning of the season of severe winds in August. Irrigated maize is recommended as a summer cover crop.—W.J.B.

264 CARREKER, J. R. **The effects of rainfall,**

land slope and cropping practices on runoff and soil losses. *J. Soil Wat. Conserv.* 1954, **9**, No. 3, 115-19, illus. [South. Piedmont Conserv. Exp. Sta., Watkinsville, Ga.]

Studies during 1940-51 were made in the Piedmont region of Georgia on the run-off from soils with slopes of 3, 7 and 11%, with slope lengths of 105, 70 and 35 ft., respectively, under 6 cropping sequences, ranging from complete cover with *Lespedeza sericea*, to continuous cropping with cotton. The above slope lengths are those recommended as the intervals between conservation terraces on the respective slopes given. Under continuous cotton, annual soil losses ranged from 5-33

to 51.34 tons per ac., with a range of 6.77 in. to 19.29 in. in amounts of run-off. Soil losses under continuous cotton grown on 3, 7 and 11% slopes averaged 3.29, 19.6 and 22.52 tons per ac., with amounts of 7.71, 10.79 and 10.96 in. run-off, respectively. On the 11% slope, under a rotation

of kudzu [*Pueraria phaseoloides*]/maize, annual average soil losses were 0.48 tons per ac. Soil losses were much more severely affected by increases in slope than run-off amounts. The implications of these data for fitting cropping practices to land capability class are discussed.—P.J.B.

WEEDS AND WEED CONTROL

265 BROWN, D. A. **Wild oats—progress in cultural control.** *Weeds* 1953, 2, No. 4, 295-9, bibl. 6. [Exp. Fm, Brandon, Manitoba]

The results are given of germination tests on wild oats (*Avena fatua*), which showed that a lengthy, but variable, period of after-ripening was necessary before the seed would germinate. Results are also given of cropping and tillage experiments carried out in western Canada to control wild oats. At Brandon, Manitoba, barley sown on 8 May averaged 28.5 wild-oat plants per sq. yd. and yielded 52 bu. grain per ac.; barley sown on 11 June had 4.4 wild-oat plants per sq. yd. and yielded 50.5 bu. grain per ac. Late sowing of barley provided a means of killing many wild-oat plants before the crop was sown. The use of autumn tillage resulted in a reduction in numbers of wild oats during the following season, particularly where the soil was disced to leave the wild-oat seed on the surface. Post-sowing tillage with a rod or wire weeder when the shoots of the sown cereals were nearing the soil surface was effective for controlling wild oats, as was the use of summer fallow. The use of temporary grassland has not, initially, produced much relief from wild oats, owing to the long dormancy of the seed under grass, though the regular use of temporary grass has, eventually, greatly reduced wild-oat infestation. The use of autumn-sown cereals, particularly winter rye, has prevented the spread of wild oats to lean land and also reduced the incidence of the weed. The best permanent measure for controlling wild oats has been the continued use of temporary grass, laid down for two or more years, in a rotation.—P.J.B.

66 EBELL, L. F. **Progress report on chemical control of wild oats.** *Proc. 7th West. Canad. Weed Contr. Conf.* 1953 1954, 32-9. [Univ. Alberta, Edmonton]

In trials in Alberta on the use of short-term soil sterilants for the control of wild oats (*Avena fatua*), TCA was most effective when applied in late autumn. The TCA remained in the soil during winter and controlled early spring weed growth. Rates of 50 lb. TCA per ac., or more, were required to give effective reduction of wild oat stands. At these rates of application, it was necessary to follow treatment with summer fallow, owing to the residual effect of the TCA on sown cereals. In

further trials in which a number of other herbicides were applied on 14 May to wild oats sown on 12 May, CIPC, IPC and CMU, at rates of 20 lb. per ac. resulted in significant plant-weight reductions of wild oats, compared with untreated controls; at a rate of 10 lb. per ac., only CIPC resulted in significant plant-weight reductions. In trials in which herbicides were applied to wild oats in the 2-3 leaf stage, DNOSBP in 20 gal. diesel oil, PCP, CIPC, maleic hydrazide amine and salt and a-cyano-b-(2,4-dichlorophenyl) acrylic amine and ester at 2.5, 5 and 10 lb. per ac., Endothal at 5, 10 and 20 lb. per ac., a high aromatic-content coal-tar derivative (Crag Herbicide No. 3) at 5, 10 and 20 gal. per ac. and an aromatic oil at 10, 20 and 40 gal. per ac. were applied. DNOSBP was the most effective material used at all rates; the 2.5 lb. per ac. treatment resulting in a wild-oat plant-weight 8.1% of that of untreated controls at the advanced flowering stage, while the 5 and 10 lb. per ac. rates gave 98-100% control of wild oats. Maleic hydrazide amine at 5 lb. and Endothal at 10 lb. per ac. gave 70 and 57% control, respectively. Wheat sown so as to emerge one day after treatment was not injured, except by IPC and CIPC. In another trial, DNOSBP at 2.5 and 5 lb. per ac. with 20 gal. diesel oil, or with 5 gal. diesel oil + water, aromatic oil and Crag Herbicide No. 3 at 20 and 40 gal. per ac., and maleic hydrazide salt at 4 and 8 lb. per ac. were applied to wild oats, into which barley had been sown and which had emerged the day before treatment. Crag Herbicide No. 3 and aromatic oil at 40 gal. per ac. resulted in 94 and 91% reduction in wild-oat stands, respectively. 5 lb. DNOSBP + 20 gal. diesel oil and 5 lb. DNOSBP + 5 gal. diesel oil + water resulted in 70 and 75% stand reductions in wild oats, respectively. The barley was seriously damaged, but, unlike the wild oats, subsequently recovered.—P.J.B.

267† WATTS, J. G. **Response of nut grass to soil applications of organic insecticides.** *J. econ. Ent.* 1954, 47, No. 3, 435-8, bibl. 7. [South Carolina Agric. Exp. Sta., Blackville]

The increase of nutgrass (*Cyperus rotundus*) in cultivated fields at the Edisto Experiment Station appears to be associated with accumulations in the soil of Chlordane, DDT, Toxaphene and especially BHC, but not with Parathion. The mechanism of

this stimulation, however, is not understood. As nutgrass exhibits apical dominance in its chain-like system of rhizomes, the possibility is admitted that the insecticides have interfered with the auxins which control this apical dominance.—E.B.O.

- 268 HAUSER, E. W. and THOMPSON, J. **Weed control. Effects of 3-amino-1,2,4-triazole and derivative on nutgrass and Johnson grass.** *J. agric. fd Chem.* 1954, **2**, No. 13, 680-1, bibl. 5. [Georgia Agric. Exp. Sta., Experiment]

Studies are reported on the effect on nutgrass (*Cyperus rotundus*) of 3-amino-1,2,4-triazole (amino triazole), amino triazole + wetting agent, and the amino triazole salts of 2,4-D, MCPA, 2,4,5-T and phosphoric acid applied at rates of 1 and 4 lb. per ac.; and of the effect of amino triazole + 0.5% Tergitol 7 at rates of 1 and 4 lb. per ac. on Johnson grass (*Sorghum halepense*). With nutgrass, foliar sprays of amino triazole and amino triazole + wetting agent caused severe inhibition of chlorophyll production in new foliar growth. The other formulations produced little or no effect on chlorophyll production. Tubers, present singly, or in 2-tuber chains, were separated from the treated parent plants after 30 days and planted individually. Chlorosis in the shoots produced by these tubers was correlated with the amount of chlorosis produced in the parent plants and was greatest where amino triazole + wetting agent was used. All plants produced from these tubers were stunted and weak for 6-8 weeks after treatment. Where the terminal tubers of chains up to 6 tubers long were dipped in amino triazole solutions containing 100, 1000 and 10,000 ppm. amino triazole, translocation of the herbicide from the dipped tuber to the next in the chain occurred. All new shoots produced from tuber chains in which the terminal tuber was dipped in 10,000 ppm. concentration of amino triazole were chlorotic. Amino triazole was readily translocated from the roots to the above-ground parts of the plants. New growth of Johnson grass after treatment at both rates of amino triazole was chlorotic. Two weeks after treatment, separated rhizomes produced severely chlorotic plants, indicating translocation of the herbicide from foliage to rhizomes.—P.J.B.

- 269† TINDALE, E. **The control of skeleton weed.** *Agric. Gaz. N.S.W.* 1954, **65**, No. 7, 352-8, illus. [Agric. Res. Inst., Wagga, N.S.W.]

As a result of experimental work it is recommended that the amine salt of 2,4-D should be used at 0.75 lb. per ac. in 5-10 gal. water per ac. against this weed. Where the soil fertility is low, an application of 1 lb. per ac. is advisable. This herbicide is suitable for treating skeleton weed in wheat, oats, barley and subterranean clover, especially where

the crop is heavy and the soil fertile. Applications should be made when the seed is at the rosette stage, but before head-formation has begun in the crop.—M.P.

- 270 MEADLY, G. R. W. and PEARCE, G. A. **The chemical control of wild radish.** *J. Dep. Agric. W. Aust.* 1954, **3**, No. 3, 309-15, illus.

Complete control of wild radish [*Raphanus raphanistrum*] was obtained with 6 oz. acid equivalent of MCPA in 5 gal. of water per ac., or the amine and sodium salt of 2,4-D. 4 oz. acid equivalent of the ester of 2,4-D in 5 gal. of water per ac. sufficed for general purpose control.—M.P.

- 271 DUBEX, J. K. **Origin, morphology and agricultural characteristics of the regur or black cotton soils of India.** *Paper read at Meet. Brit. Soc. Soil Sci., Wye Coll. September, 1954* pp. 7, bibl. 7.

[For a further account of this paper see Abs. 252.] Black-cotton soils become infested with the perennial weed, kans grass (*Saccharum spontaneum*). The wind-borne seed of this grass readily establishes itself in the wet areas of the fields and the plant then quickly extends by means of rhizomes which may go down to a depth of 4-5 ft. but are mainly concentrated within the top 2-20 in. of surface soil. With the onset on the rains, each node sends up a shoot and a very thick cover of grass is formed. Once the weed establishes itself, cultivation by ordinary implements becomes impossible. The land is left fallow until shallow-rooted, thicker-growing grasses smother the kans grass in 6-7 years time, when, enriched by organic matter, it is again brought under cultivation. "Efforts at eradicating the kans weed with high powered tractors have been successful to a limited extent. The depressions in the fields which form the foci for the spread of kans weed are not ploughed deep enough, dead furrows are left and the seed often gets re-introduced from field boundaries. The effective period for deep ploughing to eradicate kans is limited to four months from February to May. This permits the desiccating heat of the sun to kill the rhizomes". [See also *Fld Crop Abstr.* 7 : 747.]—C.L.S.

- 272 DATTA, S. K. **Some common weeds of Darjeeling and their control.** *Sci. and Cult.* 1954, **20**, No. 1, 18-22, bibl. 12. [Darjeeling Govt Coll.]

A list of 19 weeds of arable land in the Darjeeling area is presented, together with an indication of the herbicide (including hormone weedkillers) by means of which each weed can be controlled.—W.J.B.

- 273 KOBAYASHI, T. **Studies on the salt-resistance of cultivated plants. 1. Classification of weeds in reclaimed tidal land with special reference**

to the salt-resistant behaviour. *Proc. Crop Sci. Soc. Japan* 1954, **22**, No. 3-4, 34-5, English summary p. 35. [Kojima Bay Agric. Co-op. Ass. Reclamation]

A study was made of the salt (NaCl) tolerance of weeds on reclaimed tidal land. In general, weeds of the same family showed about the same degree of salt tolerance. The maximum content of NaCl tolerated by the various weed families was as follows: Chenopodiaceae 1.5% or more, Compositae and Polygonaceae 1.2-1.5%, Amarantaceae, Gramineae and Cyperaceae 0.8-1.2%, Leguminosae 0.5-0.8%.—W.J.B.

274† REPP, Gertraud. Zur Kenntnis der Selektivwirkungen von 2,4-D Verbindungen. 2. Mitteilung. 2,4-D-Wirkungen auf Wasserhaushalt und Trockensubstanzgewicht. [Towards an understanding of the selective action of 2,4-D compounds. 2. Action of 2,4-D on water economy and dry weight.] *PflSchBer.* 1954, **12**, No. 9/12, 181-8, bibl. 6, English summary p. 188.

The paper deals with changes in the saturation deficit, extent of leaf surface, turgor and stomatal aperture of 2,4-D-resistant and susceptible species after treatment with 0.2% 2,4-D. In 2,4-D-sensitive species, the morning stomatal movement was inhibited after treatment, and by afternoon, stomata were closed and gas exchange was greatly reduced. In resistant species, on the other hand, there was little difference, if any, in the stomatal aperture of treated and untreated plants; by afternoon, the stomatal aperture of both treated and untreated resistant species was similar. Grasses did not exhibit uniform reaction to 2,4-D treatment. The grasses examined, *Lolium perenne* and *Dactylis glomerata*, reacted in a manner similar to the susceptible dicotyledons, while *Avena* spp., for example, behaved like the resistant ones. Grasses generally are classed as resistant to 2,4-D but experiments in the past 3 years have demonstrated that within the Gramineae there are, as in the dicotyledons, degrees of resistance to 2,4-D, the threshold of susceptibility is, however, higher than in most dicotyledons.—D.B.

275 LINDEN, G. Über die Wirkung wiederholter Behandlung mit subletalen Konzentrationen der 2,4-Dichlorphenoxyessigsäure (2,4-D) auf *Sinapis alba* sowie weitere Untersuchungen zu Transport und Wirkungsweise der Wuchsstoffe in der Pflanze. [The effect of repeated treatment with sublethal concentrations of 2,4-D on *Sinapis alba*, also a further study of the transport and mode of action of growth substances in plants.] *Beitr. Biol. Pfl.* 1954, **30**, 343-78, bibl., illus. [Landw. Hochsch., Stuttgart-Hohenheim, W. Germany]

A reduced sensitivity to repeated treatment by 2,4-D having been noted in some plants (*Colchicum autumnale* and *Stellaria media*) but not in others (*Taraxacum* and *Ranunculus* spp.), the question was investigated in *Sinapis alba* which grows quickly and is known to be sensitive to 2,4-D. If the second treatment is applied while the plant is still reacting to the first treatment, the sensitivity to 2,4-D is increased, but if the plant has recovered from its reaction to the first treatment then the sensitivity to the second treatment is reduced. Transport of herbicides was studied in *Atriplex patula* and *Chenopodium album*. Transport is first in the basipetal direction and later towards the apex; it is mainly in the axis of the shoot and there is very little at the periphery.—D.B.

276† STRYCKERS, J. La destruction des plantes adventices au moyen de produits chimiques. [The destruction of weeds by chemicals.] 3rd edn, [n.d.], pp. 37, bibl. 26, illus., 2 charts, Brussels; Minist. Agric. [Received August, 1954]

Chemical control is regarded as merely supplementary to those cultural methods which maintain the health of the crop. There are notes on the chemical nature, mode of action, method and time of application of the herbicides, and on the treatment of crops. All this information is tabulated in two valuable charts, the smaller of the two giving the sensitivity of the most common weeds to the principal herbicides, the larger (35 × 93 cm.) providing a scheme for the destruction of weeds in 24 types of crops. For each type of crop there are entries which give the best stage of crop development at which to apply treatment, the nature of the weed plants found among the crop, the herbicide to be used and its rate of application, names of the weeds in each crop, and the best stage of development for attacking the weed.—D.B.

277† HARTOGENSIS, H. Broad spectrum herbicides. *Fm Chem.* 1954, **117**, No. 4, 37-8, illus.

A brief review is given of practical brush-control herbicides, consisting of controlled-volatility esters of 2,4-D + 2,4,5-T, which can be relied upon to kill almost all woody species, with the exception of conifers. A table gives practical information on rates of treatment for foliage treatments from the air, high-volume, high-pressure ground foliage applications, and basal stem treatments.—P.J.B.

278 HAMNER, C. L. and RAI, G. S. A new method of weed control. *Agric. Chem.* 1954, **9**, No. 10, 65 and 117. [Michigan State Coll., East Lansing]

A brief note is given on the use of paper pulp, applied to the surface of soil around plants, for

controlling weeds. The paper pulp dries to a cardboard-like consistency, preventing the growth of weeds.—P.J.B.

- 279 PRAY, B. O. and WITMAN, E. D. **On distribution of CIPC in soil.** *Weeds* 1953, **2**, No. 4, 300-1, bibl. 5. [Columbia-Southern Chem. Corp. Res. Lab., Barberton, Ohio]

In studies in S. Carolina, pre-emergence applications of 7.5 lb. CIPC were made to cotton on a sandy loam soil. Rainfall amounts of 0.91, 0.65 and 0.12 in. fell 4, 6 and 7 days, respectively, after the CIPC treatment. Maximum temperatures ranged from 65-95°F. and minimum temperatures from 49-60°F. Soil samples were taken 19 days after treatment. All the CIPC was found in the top 2 in. of soil, and on two plots only 10 and 36%, respectively, of the initial amounts of CIPC remained when the sampling was done.—P.J.B.

- 280 BLEIDNER, W. E. **Herbicide determination. Application of chromatography in determination of micro quantities of 3-(*p*-chlorophenyl)-1,1-dimethylurea.** *J. agric. fd Chem.* 1954, **2**, No. 13, 682-4, bibl. 5. [Grasselli Chem. Dep. Exp. Sta., E.I. du Pont de Nemours and Co., Inc., Wilmington, Del.]

A technique, using determinations of *p*-chloroaniline by column chromatography, is described, which enables the interference caused by traces of aromatic amine, mainly *o*-aminoacetophenone, produced by hydrolysis of plant tissues, to be eliminated.—P.J.B.

- 281† ZUKEL, J. W. **Maleic hydrazide, a plant growth inhibitor.** *Agric. Chem.* 1954, **9**, No. 10, 46-7 and 113-14, bibl. 35. [Nau-gatuck Chem. Div., U.S. Rubber Co., Beth any, Conn.]

A summary is given of work carried out on maleic hydrazide and observations are made on its status in the field of agricultural chemicals in the USA.—P.J.B.

- 282 CANADA. Western Canadian Weed Control

Conference. **Proceedings, 1953.** *West. Canad. Weed Contr. Conf.* 1953 1954, pp. 127.

The following papers are noted :

1. Tests and observations on aerial spraying in southern Alberta. By J. J. Sexsmith and D. T. Anderson, pp. 15-20. In studies on the effect of 2,4-D + oil sprays on cereal yields, barley was less subject to sterility than spring wheat. The higher the olefine content of the oil used, the closer was the yield of spring wheat to that of untreated controls.
 2. Cultural control of wild oats. By H. W. Leggett, pp. 30-2. Notes are given on the value of autumn tillage, delayed sowing of cereals, after-sowing cultivations and the use of an early-maturing cereal, for controlling *Avena fatua*.
 3. Progress report on chemical control of wild oats. By L. F. Ebell, pp. 32-9. [See Abs. 266.]
 4. Foliar application of sprays and dusts containing major and minor elements with and without 2,4-D. By D. J. Wart, pp. 51-60.
 5. Chemical control of weedy grasses. By W. G. Corns, pp. 61-4. A summary is given of the results of trials using TCA, Dalapon, CMU, Endothal, IPC and CIPC for controlling *Setaria viridis* and *Agropyron repens* in linseed, wheat, peas and other crops.
 6. Newer chemicals for weed control. By J. R. Foster, pp. 64-9. Materials discussed include CMU, PDU, Dalapon, maleic hydrazide, Endothal, TCA, IPC, CIPC, Borascu, Polybor-Chlorate and 4-chlorophenoxyacetic acid.
 7. Combining cultural and chemical weed control practices. By H. A. Friesen, pp. 69-73. A review is given of trials at a number of locations in Canada.
 8. The reaction of flax [linseed] and wheat to various concentrations of wild mustard and to its removal by 2,4-dichlorophenoxyacetic acid. By V. D. Burrows, pp. 73-8. [See Abs. 221.]
- A summary is given of general recommendations for the control of annual, winter annual, biennial and perennial weeds and for the use of post-emergence herbicides for selective weed control in field crops. A list is given of weed species classified according to their susceptibility to 2,4-D and MCPA.—P.J.B.

CROP BOTANY

- 283† KRUYT, W. **A study in connection with the problem of the hormonization of seeds.** *Acta bot. néerl.* 1954, **3**, No. 1, 1-82, bibl. 247, illus. [Res. Lab. Combined Quinine Works, Amsterdam]

The treatment of seeds with synthetic growth substances, for the purpose of stimulating growth and development, is reviewed. From experiments conducted by the author with peas, it is concluded

that synthetic growth substances administered to the seed act on the embryo not only directly but also indirectly, by way of the food reserve substance in the seed.—W.J.B.

- 284 SCHEFFER, F. and KLOKE, A. **Der Einfluss von Antibiotica auf die Entwicklung und den Nährstoffgehalt von Kulturpflanze** [The effect of antibiotics on the developme-

and nutrient content of crop plants.] *Z. PflErnähr. Dung.* 1954, **66**, No. 1, 29-38, bibl. 29. [Univ. Göttingen, W. Germany]

Since the micro-organisms essential to the production of streptomycin, penicillin and terramycin are present in the soil, it is assumed that the corresponding antibiotics are also present. Their influence on germination, growth and nutrient uptake of rye, oats and rape were studied in pot experiments, the seed having been previously treated with one of these antibiotics. Data on concentrations, length of treatment and results are tabulated. These last vary with the soil, the crops and the antibiotic used.—D.B.

85 KURTH, H. Untersuchungen über die Beeinflussung des Jarowisationseffektes durch Nachbehandlung mit höheren Temperaturen und Rücktrocknung. [An examination of the susceptibility of the vernalization effect to after-treatment by high temperatures and drying.] *Züchter* 1954, **20**, No. 10, 300-4, bibl. 20, illus. [Univ. Greifswald, Mecklenberg, E. Germany]

Experiments were conducted with seed of winter varieties of barley, rye, wheat and rape. High-temperature treatment, at 25°C., for 12, 24 or 48 hr. inhibited the tendency to germinate in seeds which had been vernalized at 3°C. for 26 or 40 days. This inhibition was stronger the shorter the vernalization period and the longer the duration of the heat treatments. Vernalized plants subjected to subsequent drying at room temperature (16-18°C.) retained their tendency to sprout. After complete vernalization (e.g. overwintered plants) it was not possible to prevent further development by growing the plants under hot-house conditions.—D.B.

86† RAPPAPORT, J. In vitro culture of plant embryos and factors controlling their growth. *Bot. Rev.* 1954, **20**, No. 4, 201-25, bibl. 119. [Univ. Virginia, USA]

87† MER, C. L. The use of the infra-red 'image converter' viewing apparatus in the study of the effects of localized wounds on the growth of etiolated *Avena* seedlings. *Ann. Bot., Lond.* 1954, **18**, No. 70, 157-69, bibl. 17, illus. [Res. Inst. Pl. Physiol., Imp. Coll. Sci. Technol., London]

88† AVERY, G. S. Jr., and ENGEL, F. Total nitrogen in relation to age and position of cells in *Avena* coleoptiles. *Amer. J. Bot.* 1954, **41**, No. 4, 310-15, bibl. 9, illus. [Brooklyn Bot. Gdn, N.Y. (G.S.A.) and Danmarks Tekniske Højskole, Østervoldgade, København, Danmark (F.E.)]

This paper is a further development of former work in *Herb. Abstr.* 16 : 1283] expressing physiological

and biochemical data on a per cell basis instead of a weight basis. Determinations of total N were made on *Avena* coleoptile tissues of varying ages, total N being regarded as an index of the amount of protoplasm present. Total N showed greatest increase during the cell division phase of growth, but continued to increase when growth consisted solely of enlargement of existing cells; this increase was approximately proportional to the increase in cell volume. The conclusion is drawn that cell enlargement is not only a matter of water uptake but is also accompanied by synthesis of additional protoplasm.—D.B.

289† THOMPSON, Betty F. The effect of light on cell division and cell elongation in seedlings of oats and peas. *Amer. J. Bot.* 1954, **41**, No. 4, 326-32, bibl. 17, illus.

This work was undertaken to find out if the responses found in earlier work [see *Herb. Abstr.* 22 : 609, *Fld Crop Abstr.* 4 : 538 and 5 : 964] were brought about by modifications in the pattern of cell division, of cell elongation, or both, and also the nature of the modification. Plant seedlings of oat and pea were grown at constant temperature and under various conditions of light or darkness. Plants were harvested daily and the material examined in paraffin sections cut longitudinally to determine the number and length of cells in the coleoptile of oat and in the first few internodes of pea and oat. "Results show that light accelerates whatever growth processes are going on while the light stimulus acts, the specific effect depending on the stage of development of the tissues concerned. Exposure very early in the course of either cell division or cell elongation accelerates the early part of that phase of growth. Exposure after either phase is well under way hastens the transition to the next phase and reduces the final number or length of cells. Light at intermediate times has a lesser degree of both effects."—D.B.

290† GOEDEWAAGEN, M. A. J. Beoordeling van de vitaliteit van het wortelstelsel. [Estimating the vitality of root systems.] *Landbouwk. Tijdschr., Wageningen* 1954, **66**, No. 8, 553-5. [Agric. Res. Sta., Groningen]

A method of determining the vitality of swamped roots, in this case apple-trees, using tetrazolium chloride (TTC) is described. Living roots become pink, owing to the formation of formozan, when colourless TTC solution in water is applied to them; dead roots remain uncoloured. Dead roots invaded by bacteria also show a pink colour when TTC is applied but the pattern of colouring in this case is different from that in living roots.—W.J.B.

291 ŽOLKEVIČ, V. N. [The use of labelled carbon in field conditions for observing translocation of assimilates.] [Russian] *Doklady Akad.*

Nauk SSSR (Proc. Acad. Sci. USSR) 1954, **96**, No. 3, 653-6, bibl. 12, illus. [Timirjazez Inst. Pl. Physiol., Acad. Sci. USSR]

The spring wheat variety Černokoloska comprised the experimental material. The plants were supplied with labelled carbon ($C^{14}O_2$) by means of an instrument (described and illustrated) and the movement of the radio-active carbon from the leaves to the ears was determined in relation to the plants' developmental phase and water supply. It is claimed that by the technique described it is possible to observe the role of individual leaves in regard to crop yields and to determine changes in rate and intensity of translocation of assimilates in plants during their ontogeny.—M.H.

- 292† WOODHAMS, Dorothy H. and KOZLOWSKI, T. T. **Effects of soil moisture stress on carbohydrate development and growth in plants.** *Amer. J. Bot.* 1954, **41**, No. 4, 316-30, bibl. 20, illus. [Univ. Massachusetts, Amherst]

Effects of different degrees of moisture stress on carbohydrate reserves and plant growth were studied. Bean and tomato plants were analyzed for starch and sugars at three periods: (1) just before the soil reached wilting percentage for the first time, (2) after plants had remained in the soil at wilting percentage for 24 hr. and were re-irrigated and remained at field capacity for 24 hr., (3) at the end of 8 weeks' growth during which time plants were subjected to 4 periods of moisture stress and re-irrigated to field capacity after the first three droughts. Samples were then taken at the end of the fourth drought which was not followed by irrigation. Before plants had reached the permanent wilting percentage for the first time sugars and starch decreased in roots, stems, and leaves. Following irrigation there was a rapid and marked starch increase but no corresponding increase in reducing and non-reducing sugars. At the end of 8 weeks' growth during which plants were subjected to several severe droughts, total reserve carbohydrates were much less than at any other period. It appears likely that appreciable moisture stress is imposed on roots before moisture is depleted to the permanent wilting percentage and each developed stress will effect changes in metabolic status of the plant as indicated by differences in carbohydrate reserves. Effects of recurrent severe droughts will bring about more serious depletion of starch and sugars.—Authors' summary.

- 293 WIERSMA, D. and VEIHMAYER, F. J. **Absence of water exudation from roots of plants grown in an atmosphere of high humidity.** *Soil Sci.* 1954, **78**, No. 1, 33-6, bibl. 4, illus. [Univ. California, Davis]

The results of trials with tomato plants were not considered to support the notion that water can be

absorbed by the above-ground parts of plants in a highly humid atmosphere and then be transferred to the soil via the roots.—P.J.B.

- 294† HESSE, W. Messung der Pflanzentranspiration mit Kleinlysometern. [**Measurement of plant transpiration using small lysimeters.**] *Z. Acker- u. Pflbau* 1954, **98**, No. 1, 107-18, bibl. 21, illus. [Geophys. Inst., Univ. Leipzig]

- 295† HOFMANN, E. and LATZKO, E. Zur Methodik vergleichender Enzymbestimmungen in Pflanzen. [**A contribution to the methodology of the comparative determination of enzymes in plants.**] *Z. Pflernähr. Dung.* 1954, **66**, No. 1, 65-71, bibl. 16. [Techn. Hochsch. München, Weihenstephan, Bavaria, W. Germany]

The procedures described were tested on several crops, including sugar-beet, cereals and grasses.—D.B.

- 296† YUEN, S. H. and POLLARD, A. G. **Determination of nitrogen in agricultural materials by the Nessler reagent. 2. Micro-determinations in plant tissue and in soil extracts.** *J. Sci. Fd. Agric.* 1954, **5**, No. 8, 364-9, bibl. 5, illus. [Agric. Chem. Dep., Imp. Coll. Sci. Technol., London]

- 297 MENZEL, R. G. **Competitive uptake by plants of potassium, rubidium, cesium, and calcium, strontium, barium from soils.** *Soil Sci.* 1954, **77**, No. 6, 419-25, bibl. 6. [Agric. Res. Serv., U.S. Dep. Agric., Beltsville, Md]

In studies using cowpeas [*Vigna sinensis*], maize and millet, determinations were made of the uptake by the plants of trace amounts of radioactive alkali and alkali earth ions applied to the soil in pot experiments. The uptake of Sr and Ba was inversely proportional to the content of exchangeable Ca in the soil, while the uptake of Rb and Cs was inversely proportional to the available K content of the soil. Distribution factors for the uptake of the alkali ions were calculated.—P.J.B.

- 298† SCHMITT, L. and JUNGERMANN, K. Über Aufnahme und pflanzenphysiologische Wirkung der Phosphorsäure verschiedener Phosphate. [**The uptake and plant physiological action of phosphoric acid when provided from different phosphates.**] *Landw. Forsch.* 1954, **6**, No. 3, 161-8, bibl. 3. [Landw. Versuchsanstalt, Darmstadt]

- 299† ATANASIU, N. Die pflanzliche Verwertung des Stickstoffs unter verschiedenen Ernährungsbedingungen. [**Plant utilization of nitrogen under different conditions of nutrition.**] *Landw. Forsch.* 1954, **6**, No. 3, 169-72, bibl. 2.

- 300† SIVADJIAN, J. Synthèse et action biologique des vitamines chez les plantes supérieures. [Synthesis and biological action of vitamins in higher plants.] *Bull. Soc. Bot., Fr.* 1953, **100**, No. 7-9, 389-404, bibl. 116.

The literature on the subject is reviewed under the following heads: (1) vitamins during germination, (2) formation of vitamins in adult plants, (3) part played by vitamins in plant physiology.—W.J.B.

- 301† FORSYTH, W. G. C. and SIMMONDS, N. W. A survey of the anthocyanins of some tropical plants. *Proc. roy. Soc.* 1954, **142**, No. 909, 549-64, bibl. 16. [Imp. Coll. Trop. Agric., Trinidad]

The anthocyanin pigments of 246 wild and cultivated plants grown in Trinidad, B.W.I., were surveyed by paper chromatographic methods. The complexity of the glycosidic combination appears to be much greater than was hitherto supposed. The hypothesis that there is a high frequency of pelargonidin among tropical plants was not confirmed.—From authors' summary.

- 302 BENTLEY, J. A. and HOUSLEY, S. Bio-assay of plant growth hormones. *Physiol. Plant.* 1954, **7**, No. 3, 405-19, bibl. 23. [Bot. Dep., Manchester Univ., England]

- 303† SCHNEIDER, R. Flammenphotometrische Kalzium-Bestimmung in Pflanzenaschen. [Photometric flame test in the determination of calcium in plant ash.] *Landw. Forsch.* 1954, **6**, No. 3, 200-1. [Landwirtschaftskammer Rheinland, Bonn]

The photometric flame test for calcium often suffers from interference by the presence of sodium, potassium and phosphoric acid. The effect of the two metals can be eliminated by a light filter; but phosphoric acid is not so eliminated. A method is described for removing interference by phosphoric acid. The results of an analysis for calcium in 19 hay samples by this modified photometric flame test and by gravimetric analysis show close agreement by the two methods.—D.B.

- 304† HINSVARK, O. N. and others. Polarographic determination of zinc in plant materials. *Anal. Chem.* 1954, **26**, No. 7, 1202-4, bibl. 8. [Hort. and Agric. Chem. Dep., Michigan State Coll., East Lansing]

A rapid and accurate quantitative method of determining the Zn content of plant material, using the zincate polarographic curve, is described.—P.J.B.

- 305† JOHNSON, C. M. and ARKLEY, T. H. Determination of molybdenum in plant tissues. *Anal. Chem.* 1954, **26**, No. 3, 572-4, bibl. 4. [Pl. Nutr. Dep., Univ. California, Berkeley]

A modification of the thiocyanate-stannous chloride method is proposed, using an isoamyl alcohol + carbon tetrachloride mixture for extracting the molybdenum thiocyanate complex from the aqueous phase. Advantages claimed for the modification are improved sensitivity, accuracy and ease of manipulation.—P.J.B.

- 306† DIOS, R. and ALBAREDA, J. M. Análisis foliar. 1. Aplicación del análisis químico de la hoja y del metodo de diagnosis visual a la investigación de deficiencias minerales en relación con los suelos de cultivo. [Application of chemical analysis of the leaf and visual diagnosis to the study of mineral deficiencies of plants in relation to cultivated soils.] *An. Edafol. Fisiol. veg.* 1954, **13**, No. 5, 339-418, bibl. 109, illus., English summary p. 411.

- 307† NIELSEN, J. P. and others. Fluorescence as a means of identifying smog markings on plants. *Science* 1954, **120**, No. 3109, 182-3, bibl. 7. [Stanford Res. Inst., Stanford, Calif.]

Observations are made on a technique for distinguishing between lesions on plants caused by smog and those caused by damage from insect pests or other cultural factors, by means of fluorescence under ultraviolet light.—P.J.B.

- 308 KOBAYASHI, T. Studies on the salt-resistance of cultivated plants. 2. Classification of cultivated plants by the salt resistance in reclaimed tidal land and ecological relation between cultivated plants and weeds. [Japanese] *Proc. Crop Sci. Soc. Japan* 1954, **22**, No. 3-4, 36-8, English summary p. 38. [Kojima Bay Agric. Co-op. Ass. Reclamation]

During the summer months the maximum content of NaCl in the soil tolerated by the different families of cultivated plants was as follows: Malvaceae and Compositae 1.2-1.5%, Cucurbitaceae, Solanaceae and Cyperaceae about 0.8%, Umbelliferae, Gramineae and Convolvulaceae 0.5-0.8%, Leguminosae below 0.5%. Differences in salt tolerance were less evident in spring, autumn and winter than in summer.—W.J.B.

- 309† WHITEHEAD, F. H. An example of taxonomic discrimination by biometric methods. *New Phytol.* 1954, **53**, No. 3, 496-510, bibl. 4, illus. [Bot. Dep., Univ. Oxford]

- 310 FEDOROV, A. K. [The role of light in the adaptation of plants to adverse winter conditions.] [Russian] *Izv. Akad. Nauk SSSR (Bull. Acad. Sci. USSR)* Ser. Biol.

1954, No. 5, 25-45, bibl. 19, illus. [Inst. Genetics, Acad. Sci. USSR]

Experiments with wheat, barley, rye and *Festuca pratensis* are reported. There is an indication that the capacity of plants to curtail in varying degrees the intensity of their growth- and developmental-processes under the influence of autumn conditions, especially light, is a factor determining their winter-resistance.—M.H.

- 311† STEHLÉ, H. Quelques notes sur la botanique et l'écologie végétale de l'archipel des Caraïbes. [Some notes on the botany and

plant ecology in the Caribbean archipelago. *J. Agric. trop. et Bot. appl.* 1954, 1, No. 1-4, 71-110.

Lists are given of plant species found on cropped land, grassland and land abandoned after cultivation.—E.B.O.

- 312 STEUBING, L. Experimentelle Untersuchungen über die Veränderung der Standortfaktoren durch Windschutzanlagen. [Experiment on the alteration of habitat factors by windbreaks.] *Oikos* 1952/3, 4, No. 2, 118-47, bibl. 39, illus.

MISCELLANEOUS

- 313† DAVIES, D. A. Experiments on artificial stimulation of rain in East Africa. *Nature, Lond.* 1954, 174, No. 4423, 256-8, bibl. 7. [E. Afr. Met. Dep.]

Following work reported in 1951 and 1952 on the artificial stimulation of rainfall at Kongwa, Tanganyika, two further series of tests which were carried out at Dodoma, in Tanganyika, are described. The seeding agent used was finely ground hygroscopic salt (mainly common salt) and the method for seeding was by means of the hydrogen balloon, described in *Nature, Lond.* 167, p. 1001, 1952. From results obtained, it is concluded that cloud seeding does stimulate a light, or very light, rainfall. The data are discussed in the light of Bowen's collision process theory (*Quart J. roy. Met. Soc.* 78, p. 37, 1952). The tests are to be continued.—M.H.

- 314 BELGIAN CONGO. Institut National pour l'Étude Agronomique du Congo Belge [INÉAC]. Bulletin climatologique annuel du Congo Belge et du Ruanda-Urundi, année 1953. [Annual climatological bulletin of the Belgian Congo and Ruanda-Urundi, 1953.] *Comm. 8. Bur. Climatol. INÉAC* 1954, pp. 153, illus. [Bruxelles]

- 315† EVANS, J. W. Mammals and birds in relation to agriculture. *Agric. Progr.* 1953, 28, Pt. 2, 99-108, bibl. 6. [Infest. Control Div., Minist. Agric., Lond.]

The means available for the control of rabbits, grey squirrels, rats, mice, rooks (the use of poisons in France is discussed) and pigeons are reviewed.—W.J.B.

- 316† TOMLINSON, A. R. A warren-ripping innovation. Agricultural protection board operates a new front-end ripper. *J. Dep. Agric. W. Aust.* 1954, 3, No. 3, 297-8, illus.

The destruction of rabbit warrens by means of

rippers forward-mounted on heavy track-laying tractors is described.—W.J.B.

- 317 ENGLAND AND WALES. Ministry of Agriculture and Fisheries. Crop protection products approval scheme. Approved list 1954. 1954, pp. 16.

- 318 MOREL, R. and others. Évolution du taux de la matière organique dans le champ d'expériences de la Station agronomique de Grignon. [Development of the amount of organic matter in the experimental field of the Agronomic Station at Grignon.] *C.R. Acad. Agric. Fr.* 1954, 40, No. 13, 487-91, bibl. 7.

The coefficient of annual destruction of soil humus was determined for the experimental plots, each of which had been subject to different fertilizer treatment. The value varied around 1% p.a. for all plots and was little affected by variations in the isohumic coefficient and harvest residues. Wheat and beet were grown alternately on the plots, and the residues, after harvest, were determined as 20% of the total grain and straw yields for wheat, and 15% of the weight of roots and tops for beet. Plots receiving 10 tons farmyard manure per ha. showed a relatively stable humus content level, but the plants exhibited N deficiency symptoms. Plots receiving NPK annually showed no significant decrease in N content ; in all other plots

CORRECTIONS

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F.A.O. Correspondents, p. iii
For Somphe, read Semple.

Abs. 319 and Author Index
For Gunbold, read Gunhold.

- in the pannonian climatic regions.] *Z. Pflernähr. Dung.* 1954, **66**, No. 1, 19-29, bibl. 13, illus. [Landw.-Chem. Bundesversuchsanstalt, Wien, Austria]
- 20† GROENEWOLT, J. K. **Research on varieties in connection with the Netherlands List of Varieties.** *Neths J. agric. Sci.* 1954, **2**, No. 3, 141-54.
- With few exceptions, only seed of varieties appearing in the Netherlands List of Varieties is allowed to be marketed. An account is given of the procedure (including field trials) which is followed in determining which varieties of field crops (including forage crops and green manures) and herbaceous crops are suitable for including in the list.—W.J.B.
- 21† THIJSSSEN, H. A. C. and others. **New instruments for agricultural research.** *Neths J. agric. Sci.* 1954, **2**, No. 3, 209-14, illus. [Lab. Phys. Met., Wageningen]
- The following instruments have been developed and are briefly described: (a) mechanical ground-water-level recorder, (b) resistance bridge for measuring soil- and water-salinity, soil-moisture and soil temperature, (c) oscillating micropsychrometer, (d) field apparatus for rapid determination of soil moisture.—W.J.B.
- 22† POLJAKOV, A. [Čeljabinsk State Breeding/Experimental Station.] [Russian] *Zemledelie (Agriculture)* 1954, **2**, No. 8, 28-31.
- The Station is located in the northern forest/steppe zone on the foot-hills of the Čeljabinsk Province where the soils are comprised of leached black-earths. The average annual precipitation is 505 mm., the maximum monthly fall, 101 mm., being in July. The last spring frosts occur in the first half of June and the first autumn frosts at the end of August, the frost-free period being about 70 days. The snow-cover lasts for 150 or 170 days, its thickness being 35-45 cm. The Station produces high-yielding varieties of agricultural crops (cereals, feed legumes, sunflowers, flax, buckwheat and forage plants) adapted to these conditions.—M.H.
- 23† ORGANIZATION FOR EUROPEAN ECONOMIC COOPERATION. **Development of the Agricultural Advisory Services in Europe since 1950.** 1954, pp. 95, Paris, O.E.E.C.
- 24 HAUGHS, M. A. and IMPER, A. D. **Crop costs.** *Econ. Rep.* **41. Enterprise Cost. Ser. 1953 N. *Scot. Coll. Agric. agric. Econ. Dep.* 1954, pp. 13.**
- The cost of production of oats, potatoes and turnips on farms of various types in the North of Scotland College area is given. Marked increases occurred in 1953 in the cost of crops per unit of yield, chiefly owing to the increased cost of labour.—M.P.
- 325 LE ROY, H. L. Ein Beitrag zur Planung und Auswertung von Feldversuchen, dargestellt an einem praktischen Beispiel. [A contribution towards the design and evaluation of field experiments, illustrated with a practical example.] *Landw. Jahrb. Schweiz.* 1954, **68**, No. 5, 443-61, bibl. 4, English and French summaries p. 461. [Inst. Tierzucht., Eidg. Techn. Hochsch., Zürich, Switzerland]
- An experiment was carried out at the Experimental Farm "Chamau" of the Swiss Federal Institute of Technology on the effect of commercial fertilizers applied in addition to stable manure, on potato yields, with a view to studying the influence of a specific experimental plan on the precision of results. The first chapter gives indications on the experimental design. By application of a special method (confounding), the differences in soil fertility can be eliminated to a large extent. The second chapter contains the description of the method of evaluation adapted to the experimental plan. Moreover, a method is described allowing the elimination of a main source of variations in yield figures, namely the varying number of plants per plot. The final discussion deals with the increase in precision by correcting the yield figures and by the application of the technique of confounding. The precision of experimental results is increased by these two factors as follows: (1) an increase from 1 to 1.8 by eliminating the difference in the number of plants per plot, and (2) an increase from about 1 to 5 by confounding the effects of manure (with corrected yields).—Author's summary.
- 326 OHLROGGE, A. J. **Plot border effects in a liming experiment.** *Agron. J.* 1954, **46**, No. 5, 241-2. [Purdue Agric. Exp. Sta., Lafayette, Ind.]
- Cultural operations carried on for 21 years across plots under rotations of maize, wheat and clover + timothy [*Phleum pratense*], resulted in border effects of 8-10 ft. between adjoining plots under different lime treatments. This was due to the movement of soil across the plots during tillage operations.—P.J.B.
- 327 KENDRICK, J. B. and others. **Chemical protection of plants from ozonated olefin (smog) injury.** [Abstract] *Phytopathology* 1954, **46**, No. 9, 494-5.
- Smog injury to plants, characteristic of that found in S. California and the San Francisco Bay area, caused by exposure to ozonated gasoline or hexene-1, can be prevented by spraying or dusting with Zineb, Ferbam, Ziram, Maneb, or Thiram. This protection was only apparent where the materials were applied in adequate amounts to both upper and lower leaf surfaces.—P.J.B.
- 328† ROMMEL, C. Die Bedeutung der Elementar-

schadenversicherung für die schweizerische Landwirtschaft. [**The importance for Swiss agriculture of insurance against damage by storm.**] *Schweiz. landw. Mh.* 1954, **32**, No. 7, 271-81.

Damage to farm buildings and crops is considered.
—D.B.

329† KREYGER, J. Het drogen en bewaren van zaaizaden. [**Drying and storage of seed.**] *Reprint 179. Cent. Inst. agric. Res., Wageningen* [from] *Zaadbelangen* 1954, **8**, No. 1-2, 6-7 and 21-3.

The following work in connexion with the drying and conservation of seed is described: (a) determination of the equilibrium moisture-contents of seeds corresponding with relative humidities of the atmosphere varying from 10 to 95%, (b) determination of loss of viability in seeds of varying moisture-content hermetically stored for 6 months at various temperatures, (c) measurement of the effect of temperature used in the drying process on the viability of seed, (d) determination of moisture-content of seeds after exposure to slow air-drying with air of a given relative humidity. The seeds used were rape, sugar-beet, perennial ryegrass, rye, maize, oats, wheat, peas, beans [*Vicia faba*], and lupins. The results of (a) are tabulated. The equilibrium moisture-contents of seeds of the crops mentioned, at temperatures of 12-25° C. (20° C. for wheat), corresponding to a relative humidity of 70%, were 8, 13.3, 14.3, 15.1, 14.6, 14.0, 14.8, 15.0, 14.8 and 13.4%, respectively. Before storage, seeds should be dried to a point where their moisture content is in equilibrium with an atmospheric R.H. of 70-75% (R.H. greater than 70-75% encourages mould and bacterial development). In experiment (b) lupin, rape, bean and pea seeds with moisture-contents in equilibrium with R.H. of 63-75% were stored for 6 months at 2, 12, 18 and 25° C. without loss of germinative capacity; at 25° the germinative capacity of these seeds was slightly reduced. Oat seeds were also unaffected at the 3 lower temperatures, but at 25° C. lost germinative capacity to a greater extent than the seeds of the 4 crops already mentioned. In the case of maize, perennial ryegrass, sugar-beet and rye, deterioration of germinative capacity was observed in seeds

having moisture-contents in equilibrium with R.H. 65-75% stored at 18° C. Seeds of the last 4 crops named, with moisture-contents in equilibrium with R.H. 75-80%, showed deterioration of germinative capacity when stored at 12° C. Maize, ryegrass and sugar-beet seed with moisture-contents in equilibrium with R.H. 80-90% showed reduced germinative capacities when stored at 2° C. Thus too high storage temperature and too high a moisture content in seeds both affected adversely the viability of hermetically stored seed. In experiment (c) seeds with moisture contents in equilibrium with R.H. 50, 70 and 90 were dried at 30, 40, 50, 60 and 70° C. for periods (adjusted to temperature and seed moisture-content) of 1-4 hr. Seed heated to 30° C. for 4 hr. (3 hr. in the case of the abnormally damp seed) did not lose germinative capacity. At 40° C. beans showed a slight loss of germinative capacity at all moisture-contents but no other seeds were affected. At 50° C. (heat applied for 2 hr.) only lupins, rape and peas showed no loss of germinative capacity. At 60 and 70° C. all seeds tested showed some loss of viability. The results are tabulated. In experiment (d) seeds were exposed to slow drying with air of varying R.H. until a constant moisture-content in the seed was obtained. The moisture-contents obtained were in accordance with the data obtained in (a). Thus, provided that the R.H. of the air used and the corresponding equilibrium moisture-content of the seed are known, the minimum moisture-content in seed attainable by the slow-drying process can be calculated.—W.J.B.

330† SWEDEN. Kungl. Lantbrukshögskolan och Statens Lantbruksförsök. Statens Jordbruksförsök. **Swedish seed production.** *Särtryck och Smdskr. 81. K. LantbrHögsk. LantbrFors.* 1954, pp. 60, illus.

This publication is intended for the information of foreign readers and contains the following sub-headings: Swedish seed-growing in relation to plant production. By G. Nilsson-Leissner. Swedish varieties and strains, their characteristics and cultivation districts. By S. Eliasson. Swedish seed-production practice and control. By H. Esbo and E. Åkerberg. Cultivation and control of seed potatoes. By H. Esbo. The Swedish seed trade and its organization. By G. Nilsson-Leissner.—P.J.B.

REPORTS

The notes below indicate the main investigations in the reports covered, in so far as they concern this journal. Where a separate abstract has been made from a particularly interesting section of a report, this is indicated.

331 **Great Britain.** Hasler and Co., Ltd., Essex.

Fifth Annual Report on trial and experimental work carried out at Throws, Little Dunmow, 1952-53. By P. R. Hayward, [n.d.], pp. 48, illus. [Received May, 1954]

[See *Fld Crop Abstr.* 6 : 1594]

INVESTIGATIONS REPORTED :

1. Winter-wheat trials, pp. 5-8. Of the 12 new and

old varieties studied, Later and Ministre gave good yields.

2. Spring-wheat trials, pp. 8-11. Atson Atle (4138), a new variety of Swedish origin, yielded more than the other varieties tested and had good grain quality.

3. Spring-oats trial, pp. 11-13. High concentrations of BHC dust caused distortion of the plants of Sun II and Bellonne; both had been good yielders in previous years. Of the other 6 varieties tested, Rex A and Marne were the best.

4. Spring-barley trial, pp. 13-15. Proctor appears to be the heaviest-yielding variety and shows improved grain quality. Earl gave the lowest yield.

5. Winter-bean composite stock trials, pp. 16-22. The composite stock gave a significant yield increase compared with three of its component varieties. S/1/47/GBN/51 also gave high yields. Details of selection- and progeny-tests for high-yielding lines are given.—M.P.

332 **Gold Coast** Department of Agriculture. Annual Report for the period 1st April, 1952 to 31st March, 1953. Accra, 1954, pp. 28.

INVESTIGATIONS REPORTED :

1. Fibres, p. 10. At Bunsu, an estimated yield of 100 lb. jute fibre per acre was obtained. At Ejura, *Irena lobata* yielded at the rate of 1200 lb. per acre.

2. Potatoes, p. 10. Trials confirmed that the best treatment for breaking dormancy was exposure to calcium carbide, cutting in two and planting immediately.

3. Rice, p. 10. In the Colony, broadcasting has proved superior to transplanting without water control.

4. Weeds, p. 10. Lalang grass (*Imperata cylindrica*) was controlled by a pigeon pea fallow.—L.S.

333 **Tanganyika** Department of Agriculture. Annual Report for 1952. Section III. Dar es Salaam, 1954, pp. 107.

INVESTIGATIONS REPORTED :

1. Cereal trials at Lyamungu, Moshi, p. 27. The barley varieties Research and Glacier, and the wheat varieties 184P.2A.1A and 350A.D.9C.2, all obtained from Kenya, gave excellent yields.

2. Interplanting trials in sisal. Mlingano, Ngweni, p. 36. Maize, beans and sorghum were intercropped with sisal. Sorghum had a depressing effect on sisal growth.

3. Use of underground storage pits. Morogoro, pp. 50-1. After 1 year's storage, maize was in excellent condition, due to carbon dioxide accumulation which prevented infestation.

4. Sucking bugs on beans. Morogoro, pp. 51-2. The main insects concerned are *Acanthomia horrida* and *Nezara viridula*. Laboratory tests indicate that DDT may provide an effective control.

5. Sorghum varieties, pp. 61-5. Work is still of an

experimental nature. Bird damage is severe, especially from quelea. Early maturity results in the grain being hardened before the invasion of quelea occurs, but this is of benefit only if the area is free from bush and scrub which would support grain-eating birds. A compact, inverted head suffers less than other types. A Jowar variety from India (Nandayal Poona) has a compact, well-ventilated panicle.

6. Variety trials on sorghum susceptibility to *Striga hermontheca*. Mabuki, pp. 64-5. Dobbs possesses a degree of *Striga* resistance. Witchweed can be cleared from the land, if all the plants are uprooted each season before they flower.

7. Variety trials with cassava. Mbuga, pp. 67-8. Varieties from Amani show better yields and a higher degree of mosaic resistance than the local Kalagala.

8. Wheat trials in the southern highlands, pp. 90-3. The same varieties seem to be suitable to the same altitudes over the province as a whole. Below 6300 ft. at Kilolo and Sao Hill (Iringa district) and at Mbozi and Uyole (Mbeya district) 291J111 and 294B2A3 yielded well. Above 6300 ft. at Kalinga and Kasanga (Iringa), 337BE2F2 yielded best; at Njiapana (Mbeya) 341F2D2 was best.

9. Fertilizer and residual fertilizer trials on wheat at Sao Hill (Iringa), pp. 92-3. Farmyard manure, potash and phosphate at the single level increased yields, but nitrogen had no effect. On the Irambo Farm, a complex factorial experiment showed that only farmyard manure gave a significant response. Only in one case did the addition of fertilizer to manure raise the yield above that obtained with manure alone. Except for potash and nitrogen together, a combination of fertilizers depressed yields.—M.P.

334 **Tanganyika** Department of Veterinary Services. Annual Report for 1953. Dar es Salaam, 1954, pp. 57 + appendix.

Velvet beans for fodder, grain or seed, pp. 39-40. Of 6 varieties planted, Somerset and Local White were the quickest maturing and yielded well, the latter giving 1384 lb. per ac. of dried shelled seed, and the former 6096 lb. per ac. of green fodder.—M.P.

335 **Northern Rhodesia** Department of Agriculture. Annual report for the year 1953. Lusaka, 1954, pp. 27, 2s. 6d.

INVESTIGATIONS REPORTED :

1. Fertilizer trials in the eastern, southern and central provinces, pp. 18-20. N increased the yield of maize in all cases; at Katete the yield was nearly doubled. At Magoye and Mazabuka greatest effects were produced by the application of N and P together. With maize grown at Magoye after sunnhemp as green-manure, there was a large response to super-phosphate and a

small one to sulphate of ammonia. A variation in yield was also noticed with differences in the time of applying the fertilizers. At Katete, P produced a greater effect on groundnuts than in previous years, but there was no response to lime or potash. Only N increased yields of sorghum at Serenje and results suggested that sulphate of ammonia was most beneficial if applied at sowing.

2. Maize rust, *Puccinia polysora*, p. 20. This disease was recorded for the first time in 1953. Resistant lines are being selected.

3. Sunnhemp as a seed crop, p. 24. At Chiwefwe, yields were 1012 lb. per ac., which was 3 times as much as at Serenje or Muswishi.

4. Spacing trials with rice varieties. Eastern Province, p. 24. Earlier-maturing varieties, Burma and Tanganyika, yielded better at 6 × 6 in. spacing, whereas later varieties gave higher yields at 6 × 9 in. spacing. Kota Kota and other very late-maturing varieties did not appear to be affected by the spacing. Afaa Mwanga and Demerara Creole gave the highest yields, while Kota Kota and Demerara Creole were best for quality.

5. Rice experiments at Namushakende, Barotseland, p. 24. Angola No. 6 proved best in small experimental plots, but in the field-scale plots Tanganyika Faya was best.—M.P.

336 **Southern Rhodesia.** Research and Specialist Services. Annual Report of the Director for the year ending 30th September, 1953. Salisbury, 1954, pp. 54.

INVESTIGATIONS REPORTED :

1. Maize experiments. Salisbury Experiment Station, pp. 15-16. [See Abs. 84.]

2. Crop trials. Salisbury Experiment Station, pp. 16-17. The soyabean variety No. 147 yielded best with 11 bags per ac. approx. [1 bag = 200 lb.] The 2ft. × 3 in. spacing was better than wider ones. Up-to-Date was the highest yielding of all potato varieties tested. The early varieties dug in April did not keep well for planting 6 months later as a summer crop. Cuban kenaf, [*Hibiscus cannabinus*], yielding over 1 ton fibre per ac., was better than the Brazilian or Egyptian varieties.

3. Maize trial. Gwebi College, pp. 20-3. Double-hybrid maize yielded 5 bags per ac. more than Hickory King.

4. Herbicide experiments. Henderson Research Station, p. 28. MCPA and amine 2,4-D gave good control of weeds in summer wheat. Where Rapoko grass was prevalent, 1 lb. acid equivalent 2,4-D per ac. pre-emergence treatment gave best results, though post-emergence treatments alone would be the most economical.

5. Grasslands Research Station, Marandellas, pp. 28-34.

6. Crop trials. Matopos Research Station, pp. 35-9. The Argentine sorghum varieties 5152 and 5140 outyielded all others with the exception of Dwarf

White Milo. Spacing at one-half of the optimum, together with December sowing, gave higher yields with the three varieties of sorghum tested. Maize yields were raised by applying 10 tons of compost per ac., but not by 5 tons. The sunflower variety Mars gave high yields on two soil types.

7. Bird control. Nyamandhlovu Sub-station, p. 40. Good results were obtained by dynamiting quelea colonies with 2-5 50 lb. cases of 60% ammon dynamite per ac. with the charges 20 ft. apart.

8. Sabi Valley Experiment Station, pp. 41-2. September-early November was found to be the best sowing time for maize. Puse 4 was the best wheat variety.—M.P.

337 **Zanzibar** Department of Agriculture. Annual Report for Zanzibar 1953. 1954, pp. 29.

INVESTIGATIONS REPORTED :

1. Cassava variety trials, Kizimbani, p. 8. The local standard variety Msitu yielded 5.7 tons per ac. Of the Amani hybrids, the varieties 4697/4 and 46106/27 yielded 9.2 and 8.8 tons per ac., respectively, but both are bitter. There has been a tendency towards a decrease in resistance to streak and mosaic diseases and in yields over the past three years.

2. Sweet potato variety trials, p. 13. The varieties imported from Hong Kong were outyielded by B.44 and were not as palatable as Caroline Lea.

3. Yams. Makunduchi, p. 13. Bottleneck Lisbon, when manured, yielded seven times as heavily as when unmanured.—M.P.

338 **Australia.** Commonwealth Scientific and Industrial Research Organization. Fifth Annual Report for the year ending 30th June, 1953. Canberra, 1953, pp. 191. [Received July, 1954]

Cereal trials at Kojonup, Western Australia, p. 31. In the oat grazing and recovery trials, Orien succeeded well and Acacia gave a high green-yield but was later in maturing. Yields ranged from 40.2 to 57.6 bu. per ac. Of the 5 barley varieties, Atlas yielded 60.5 bu. per ac. and Research gave the highest green-yield. Grain yields ranged from 52.4 to 60.5 bu. per ac. The wheat variety Insignia 49 was superior to Gabo and Wongoondy in early-maturity trials. Eureka and Yalta were the best of the mid-season varieties.—M.P.

339 **India.** Indian Council of Agricultural Research. Annual Report for 1951-2. Simla, 1954, pp. 181.

An account is given of recent progress in agricultural research in India. The following are among the results reported.

1. Rice varieties, pp. 14-16. In trials in Kashmir, several Chinese varieties yielded 50-75% more grain than the highest-yielding Kashmir variety,

egum. Chinese varieties are being distributed among cultivators. Promising varieties in Bombay State, Hyderabad, Punjab, West Bengal and Coorg are also mentioned.

Hybrid maize, pp. 22-3. In most centres, some

hybrids from the USA outyielded local varieties.

3. Trials with varieties of pulses, pp. 28-32. Varietal trials in different states of India, in which varieties of the pulses used for human consumption were compared, are reported.—W.J.B.

BOOKS

40† HUTCHINSON, J. and DALZIEL, J. M. **Flora of West Tropical Africa. Vol. 1, Pt. 1.** 2nd edn, revised by R. W. J. Keay, 1954, pp. 295, bibl. 67, illus., London; Crown Agents for the Colonies, 26 × 16 cm., 25s.

The present volume is a revision of the 1st edition of this work published in 1927 and now out of print. Since that date there have been explorations, plant collections and an increase in knowledge of the taxonomy of species which have necessitated a considerable addition to, and revision of, the 1st edition. There has been a fairly thorough revision of some species, while for others the original text has been followed without significant change. In his foreword, the Director of the Royal Botanic Gardens, Kew, quotes the revision of the genus *Polygala* and the family Podostemaceae as examples of the wealth of new material which has accumulated since the publication of the 1st edition. The revision of the text is not wholly additive; it is also exclusive, for in this edition, the northern limit of the area has been brought further south from the tropic of Cancer to latitude 18°N., thus including a number of Saharan species which belong to a desert and semi-desert community which is quite distinct from the rest of the area dealt with. The main part of the text is at once a key and an illustrated and descriptive account of plants found in tropical West Africa. Those dealt with in Vol. 1, part 1 include the Gymnospermae (Cycadaceae and Podocarpaceae), Chlamydomermae (Gnetaceae) and those orders of the Angiospermae which lie phylogenetically between the Annonales and the Guttiferales. In addition to revising the main text, the account of botanical explorations in West Africa and the bibliography of works dealing mainly with West African botany have been brought up to date. The work of revision has been done by an experienced taxonomist who already possessed an extensive knowledge of the flora of the region and was thus in a position to assess the more urgent needs in any such task."—J. Brown.

41 BELGIAN CONGO. Institut National pour l'Étude Agronomique du Congo Belge [INÉAC]. Flore du Congo belge et du Ruanda-Urundi. Spermatophytes. **Flora of the Belgian Congo and Ruanda-Urundi.**

Spermatophytes. Vol. 5. 1954, pp. 377, illus., Bruxelles; 25 × 16 cm., 300 fr.

[See *Fld Crop Abstr.* 7 : 715.] The fifth volume of this work deals with 2 tribes of the Papilionatae: Galegeae and Hedysareae. Each chapter includes descriptions of the genera and species, as well as keys to the identification of subordinate groups and notes on distribution, habitat, etc. Amongst the Galegeae are the genera *Astragalus*, *Sesbania*, *Tephrosia* and *Indigofera*, and amongst the Hedysareae the genera *Desmodium*, *Alysicarpus*, *Stylosanthes*, *Aeschynomene*, *Smithia* and *Arachis* (with *A. hypogaea*). There are indexes of scientific terms and of vernacular names.—E. Biasutti Owen.

342 MUNTONA, LTD. and FISON, E., LTD. **Mono-graphs on malt and malt products. The identification of threshed barley.** 1954, pp. 18, illus, bibl. 7, Bedford; Muntona, Ltd.

Methods of identifying British-grown barley varieties, by means of grain characters are described. The following characters are used in the identification of varieties: (a) size, shape and colour of grain, (b) character of the rachilla (length and hair type), (c) size and shape of the base of the grain, (d) serration and pigmentation of the lateral veins of the dorsal palea [lemma], (e) size of lodicules. A brief account is given of the identification, using the diagnostic features listed above, of Plumage Archer, Spratt Archer, Earl, Proctor, Beorna, Carlsberg, Pioneer, Provost, Maythorpe, Freja, Ymer, Camton, Prefect, Kenia and Maja, Herta and Rika. When using the identification methods mentioned above, no distinction can be made between Kenia and Maja or between Herta and Rika. The grain characteristics of the varieties mentioned are also presented in tabular form. There are photographic illustrations of the grain of 11 varieties.—W. J. Baukwill.

343 KARPENKO, P. V. **[Seed production of sugar-beet.]** [Russian] 1953, pp. 231, bibl. 48, illus., Moscow; State Publ. House for Agric., 21 × 14 cm., 3 roubles, 95 kopeks, 3s. 6d. [Received August, 1954]

The work is in 8 chapters and gives information on the following: history of the cultivation of sugar-beet, biology and structure in the first- and second-year plants; botanical characteristics of wild forms

of beet ; selection and seed production ; varietal characters as influenced by growth conditions ; cultivation of mother-plants and of plants selected for transplanting ; diseases and pests.—M. Hall.

- 344 ANDERSON, J. A. and ALCOCK, A. W. [Editors] **Storage of cereal grains and their products.** 1954, pp. ix + 515, bibl. at end of each chapter, illus., St. Paul, Minnesota ; American Ass. Cereal Chem., 23 × 6 cm., \$ 11.

Each of the eleven chapters of this book has been written by one or more experts. The first six chapters deal with moisture and its measurement, chemical, physical and nutritive changes, microflora, respiration and heating, insects and rodents. Three of the last five chapters are concerned with grain drying and storage. As the preface points out, the book gives most emphasis to North American investigations and practices.—C. L. Skidmore.

- 345† WILLIS, S. J. **Weed control in farm and garden.** 1954, pp. 184, illus., London ; Vinton & Co., Ltd., 19 × 12 cm., 8s. 6d.

This book is primarily intended for the use of Farm Institute students, for whom it provides an eminently practical account of the importance of weeds in the farm economy, the control of weeds by management, cultivation and herbicides and a review of different herbicides in current use in Britain. Among the herbicides considered are : sodium chlorate, CMU, sulphuric acid, DNC, DNOSBP, mineral oils, MCPA, 2,4-D and 2,4,5-T. The properties and uses of these, and other herbicides of lesser importance, are reviewed individually and the subject of weed control is considered from the point of view of suitable techniques for use in specific crops.—P. J. Boyle.

- 346† BLAICH, O. P. **Agriculture in British Guiana.**

Census 1952. Vol. 1, No. 1. [n.d.], pp. 99, illus., British Guiana, Georgetown ; Dir. Agric., 26 × 21 cm. [Received 1954]

There are reports on the acreage, yield and distribution of each of the main crops grown, which include rice and maize.—W. J. Baulkwill.

- 347 RHODESIAN FARMER. **Yearbook.** 1953, pp. 262, illus., Salisbury ; Rhod. Prin. Publ. Co., 24 × 15 cm., 21s.

This, the first publication of its kind in Central Africa, is a valuable compendium of facts and figures covering most aspects of farming as it is practised in Rhodesia. The yearbook gives details of the breeds of cattle kept, the crops grown, the farm machinery used and the fertilizer applied to the land. There are short articles on maize, wheat, potatoes, groundnuts, sorghum, native agriculture, cotton, dams, soil conservation, research and experiment, plant diseases, weeds and fertilizers.—A. G. G. Hill.

- 348 JEPSON, W. F. **A critical review of the world literature on the Lepidopterous stalk borers of tropical graminaceous crops.** 1954, pp. vi + 127, bibl. 490, London ; Commonw. Inst. Ent., 25 × 17 cm., 15s.

- 349 BEAR, F. E. **Soils and fertilizers.** 4th edn. 1953, pp. viii + 420, bibl. at end of each chapter, illus., New York ; John Wiley & Sons, Inc., London ; Chapman and Hall, Ltd., 23 × 15.5 cm., 48s.

The book has been completely re-written for the fourth edition and new material has been added.

- 350† GREAT BRITAIN. Commonwealth Bureau of Soil Science. **Bibliography of soil science, fertilizers and general agronomy. 1950-1953.** 1954, pp. xxviii + 711, Harpenden ; Commonw. Bur. Soil Sci., 18 × 12 cm., 40s.

NEWS ITEMS AND NOTES

Great Britain

51 BRITISH SOCIETY OF ANIMAL PRODUCTION. The annual summer meeting of the Society, which was held at the Royal Agricultural College, Cirencester, Gloucestershire, from the 13th to 17th September, inclusive, was attended by over 80 members, including a number from overseas. In addition to the presentation of papers, numerous visits were arranged to representative farms in the Cotswolds where crops, pastures and livestock were inspected.—A.G.G.H.

52 BRITISH SOCIETY OF SOIL SCIENCE. The eighth annual general meeting of the Society was held at Wye College, Kent, from the 17th-20th September, 1954. In addition to the presentation of papers, visits were arranged to allow members to examine profiles of the more important soils of the College Farm, the High and Low Weald of Kent and Romney Marsh.—C.L.S.

France

53† JOURNAL D'AGRICULTURE TROPICALE ET DE BOTANIQUE APPLIQUÉE. This new journal, which supersedes *Revue Internationale de Botanique Appliquée* [see *Field Crop Abstr.* 7 : 1089], was founded to maintain a connexion between the National Museum of Natural History of Paris and the territories of Overseas France for studies in all branches of agronomy. Vol. 1, No. 1-4 of January-April, 1954, is the first issue of this journal.—E.B.O.

Netherlands

54† AGRICULTURAL DOCUMENTATION CENTRE, WAGENINGEN. The documentation departments of Wageningen Agricultural College and of the Ministry of Agriculture were combined in a single Agricultural Documentation Centre at Wageningen in 1951. Work at the Centre is divided into "active" and "passive" documentation. Active documentation comprises: weekly publication of *Landbouwdocumentatie* containing about 140 indicative references from world literature, publication of phototyped copies of the above references for the card-index at the Centre and for the card-indexes of about 40 other institutions in the Netherlands, publication of lists of references and newly-published books for the use of certain agricultural journals and agricultural libraries in the Netherlands, collection of references (source-list) on selected subjects in anticipation of possible enquiries, collection of references suitable for card-indexing issued by other documentation centres. Passive documentation is the documentation which arises in the course of answering enquiries. Card-indexing follows the Universal Decimal System. *Landbouwoorl* June, 1954.—W.J.B.

55† AT THE INVITATION OF COCOBRO (the Foundation for Co-ordination of Research on Bread Grains), Wageningen, a conference was held on 22 April, 1954, at Braunschweig-Gliesmarode, Germany, where representatives of

agronomic and plant-breeding institutions from the Netherlands, Belgium, Switzerland, Austria, Denmark and Germany met and discussed problems of common interest. As a result of the conference, members of a Committee for Research on the Climatic Adaptability of Cereals were appointed. The Committee will work out a joint programme of research with the following main objects: (a) to carry out international tests on time of sowing with different species and varieties, (b) to make climatic descriptions of the different regions where cereals are grown, (c) to develop and co-ordinate test and selection methods (cold resistance, winterhardiness, vernalization, heat- and drought-resistance will all be considered), (d) to prove standard seed for the various institutions concerned. Representatives of Britain, France, Italy and Sweden, who were also invited to the conference, were unable to attend. Communication from COCOBRO, *Wageningen* September, 1954 and *Neths J. agric. Sci.* August, 1954.—W.J.B.

Switzerland

356† AGRICULTURAL ADVISORY SERVICE. A course on new methods in the Agricultural Advisory Service was held in May, 1954, by the Association of Swiss Agriculturists. Papers dealt with the Swiss Service and the systems practised in other countries. There were more detailed accounts of the structure of the Advisory Service in Holland, Southern Germany and Great Britain. Other papers were concerned with the place of agricultural economics in an advisory service. *Schweiz. landw. Mh.* August, 1954.—D.B.

Italy

357† SPRINKLER IRRIGATION. An International Centre for Studies on Sprinkler Irrigation was founded in Verona, Italy, in July, 1953, with the assistance of various Italian organizations. The experimental research is carried out in collaboration with various scientific institutes, among which is the Experimental Centre for Sprinkler Irrigation, a branch of the Institute of Agricultural Mechanics, Bologna University. The publication of a quarterly review dealing exclusively with problems of sprinkler irrigation is projected. Sprinkler irrigation developed in Italy after the Second World War and is increasing rapidly, mainly in the Tre Venezie regions. Its development in southern Italy and the Italian islands is slow. Of 120,000 ha. under sprinkler irrigation in Italy at the beginning of 1954, 65,000 were in the Tre Venezie. It is estimated that 200,000 ha. will be sprinkler irrigated by the end of 1955 and, possibly, a million by 1960. *Humus* July-August, 1954.—E.B.O.

Nigeria

358 NIGER AGRICULTURAL PROJECT. The agricultural settlement scheme, begun at Mokwa in 1949 by the Central Government and the Colonial Development Corporation, was taken over by the Northern Regional Government on

1 June, 1954. The project is intended to determine the economic value of mechanized farming in sparsely populated lands and to develop organized land settlement. The financial burden involved in the further experimental work still necessary has been assumed by the Northern Regional Government. The work is to be directed by the Regional Department of Agriculture, with the help of a local advisory committee. At Mokwa, an experimental farm and a training centre for veterinary tsetse-control staff are to be established. *Colon. Devel.* Autumn, 1954, No. 19.—M.P.

Senegal

359 IN THE SEFA-KAFRINE GROUNDNUT SCHEME in the Casamance, yields of 1300 lb. per ac. of groundnuts have been obtained, whereas the average yield of the country is 770 lb. per ac. Senegal now produces 440,000 tons of the total of 570,000 tons of groundnuts produced by French West Africa. Millet in rotation with groundnuts is being encouraged. The Richard Toll Rice Scheme plans to produce 25,000 tons of rice per annum, and vast construction works have been carried out to provide the necessary fresh water. The first crop yielded satisfactorily at 1.2 tons per ac. Senegal possesses large mineral deposits of some value, including phosphates. *Colon. Devel.* Autumn, 1954, No. 19.—M.P.

F.A.O.

360 WORLD AGRICULTURAL CENSUS, 1950. It is an-

nounced (F.A.O. Press Release No. 25) that results of the census will be published in 3 volumes, the first at the end of 1954 on the statistical methods used, the second and third during 1955 and 1956 on the figures for individual countries and on the comparative evaluation of these figures, respectively. The census is exclusive of China and the USSR. A further census is to be made in 1960. *Chem. and Industr.* 10 July, 1954.—W.J.B.

Enquiries received

361 The following are amongst the subjects of enquiries received and answered by this Bureau during the period August, 1953, to November, 1954. Further information concerning them may be obtained from this Bureau, if required :

Rush control, bibliography on.

The yield of an oats/barley mixture compared with the yields of oats and barley grown alone.

Potato tubers, sprout induction.

Rice ; photoperiodism and double-cropping.

Review articles

362 IT IS PROPOSED to publish a review article on some subject of special interest in each issue of this journal, beginning with No. 1 of this volume. Suggestions for future review articles, or comments on those published, will be welcomed by the Editor.—A.G.G.H.